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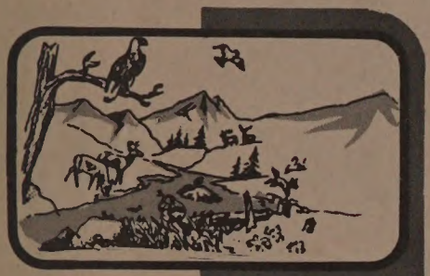
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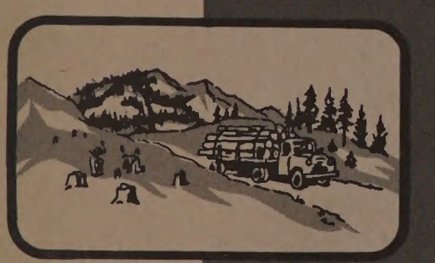
DRAFT ENVIRONMENTAL IMPACT STATEMENT

SAN JUAN NATIONAL FOREST









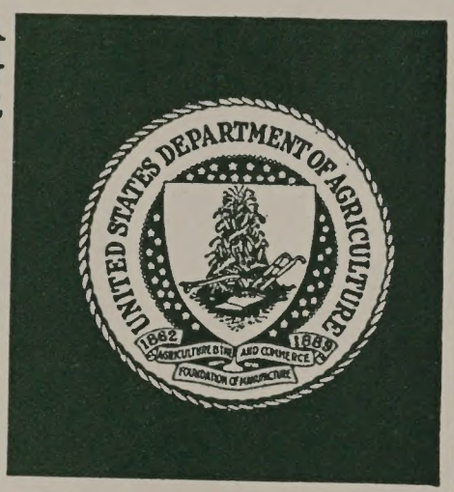


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SAN JUAN NATIONAL FOREST LAND AND
RESOURCE MANAGEMENT PLAN

02-13-82-04

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Type of Action: Administrative

Lead Agency: USDA-Forest Service

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Abstract: Eight alternatives for development of a Land and Resource Management Plan for the 1,867,782 acre San Juan National Forest are described and evaluated. The alternatives are: Alternative A - emphasis is on opportunities to provide a variety of non-market outputs; Alternative B - emphasis is on opportunities to provide an array of market outputs; Alternative C - emphasis is a mixture of market and non-market outputs; Alternative D - emphasis is on producing market outputs and operating on a 20 to 35 percent reduction in budget; Alternative E - emphasis is on meeting Resources Planning Act and Regional goals; Alternative F - emphasis is on continuation of present management direction (the "No Action Alternative"); Alternative G - emphasis is on producing market outputs and operating on a limited increase in budget the first 10-year period and a reduced budget thereafter; Alternative H - emphasis is on producing market outputs while maintaining some and slightly increasing other non-market outputs.

Alternative H constitutes the Forest Service preferred alternative and the proposed Forest Plan. The Plan will guide management of the Forest for the next 50 years (through the year 2030), and will be revised at least every ten years.

Comments must be received by:

Please retain your copy of this draft EIS. Unless the extent of public comment is such as to require that it be substantially revised, the final EIS is anticipated to be a supplement to this draft statement.

777558

San Juan National Forest
Land and Resource Management Plan
Draft Environmental Impact Statement

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1. purpose and need

CHAPTER I

PURPOSE AND NEED

OVERVIEW

This draft Environmental Impact Statement (EIS) discloses a proposed course of action, as well as alternatives to that proposed action, for managing the San Juan National Forest. It also describes the environment to be affected and the potential environmental consequences of implementing the proposed action and each alternative. Preparation of an environmental impact statement is required by the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations found in Title 40, Code of Federal Regulations, Part 1500 (40 CFR 1500), and the implementing regulations of the National Forest Management Act (NFMA) in 36 CFR 219. The EIS is prepared in the format established in 40 CFR 1502.10, of the CEQ regulations.

A notice of intent to prepare an environmental impact statement for the San Juan National Forest Plan was published in the Federal Register on July 9, 1979. A revised notice of intent was published on November 14, 1980.

The proposed action is described in a document titled "San Juan National Forest Land and Resource Management Plan (Forest Plan)." For purposes of NEPA disclosure, this draft EIS and the proposed Forest Plan are treated as combined documents (40 CFR 1506.4).

The planning process as specified in the implementing regulations of NFMA was followed in developing the proposed action. The planning process uses an interdisciplinary approach to develop the proposed action and the alternatives (36 CFR 219.5). The planning actions described in the regulations [36 CFR 219.5(b)(k)] and used in this Forest planning process are the following:

1. Identification of Issues, Concerns and Opportunities;
2. Development of Planning Criteria;
3. Inventory Data and Information Collection;
4. Analysis of the Management Situation;
5. Formulation of Alternatives;
6. Estimation of Effects of Alternatives;
7. Evaluation of Alternatives;
8. Selection of the Preferred Alternative (or "Proposed Action");
9. Implementation of the Forest Plan; and
10. Monitoring and evaluation of the Forest Plan.

All of the documents, files, and planning actions that chronicle the Forest planning process are available for inspection during regular business hours at the San Juan National Forest Supervisor's Office, 701 Camino del Rio, Durango, Colorado. These planning actions detail information and decisions used in developing the Forest Plan as required in 36 CFR 219.11(g). The planning actions are incorporated by reference in the text and in the appendices of this draft EIS and the proposed Forest Plan.

Preparation of the Forest Plan, the proposed course of action, is required by the National Forest Management Act of 1976 which amends the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974. NFMA regulations are found in 36 CFR 219 and cited throughout this draft EIS. Forest planning occurs within the overall framework of both national and regional planning as structured by the laws and implementing regulations cited above. Through the national RPA Program, the Regional Plan establishes management standards and guidelines, attempts to resolve regionally significant issues and concerns, and assigns outputs and activities (RPA targets) to the Forests within the Region. The question of achieving assigned RPA targets and resolving local-area issues and concerns is addressed in the Forest Plan. The goal of the Forest Plan is to assure multiple use and protection of Forest resources; compliance with regulations; and consideration of local, regional, and national issues.

The purpose of the Forest Plan is to guide management of the San Juan National Forest for the next 50 years (through the year 2030).

The Plan will be revised at least every 10 years, as specified in 36 CFR 219.11(e) and (f). It will replace all previous resource management plans prepared for the Forest. Upon final approval of the Forest Plan, all subsequent activities affecting the Forest, including budget proposals, are required to be in compliance with the Plan in accordance with 36 CFR 219.11(d). In addition, all permits, contracts, and other instruments for the use and occupancy of National Forest System lands must be in conformance with the Forest Plan as per 16 United States Code (USC) 1604(i).

The final EIS prepared for the Forest Plan will be used in preparing future environmental assessments through tiering in accordance with 40 CFR 1502.20 and 1508.28. Tiering means that environmental assessments prepared for projects arising from the Plan will refer to the EIS, Forest Plan, and associated documents rather than repeat information. Environmental assessments for specific projects will therefore be shorter and concentrate on issues unique to the project. Environmental assessments will not be written for projects and activities adequately covered in this EIS.

This draft EIS and the proposed Forest Plan are being circulated for review and comment. After the close of the comment period, the Forest Plan will be revised as necessary and the final EIS will be prepared, filed with the Environmental Protection Agency, and made available to the public. The Regional Forester will use the final EIS in making a decision under NFMA as to the approval of the Forest Plan as per 36 CFR 219.11(c). This decision will be documented in a Record of Decision (ROD) which will be available to the public.

The Colorado Wilderness Act of 1980 (PL 96-560) designated three Wilderness Study Areas on the San Juan National Forest and directed the Forest Service to analyze and report on the suitability or unsuitability of the three areas for inclusion in the National Wilderness Preservation System. This analysis is also being done in the San Juan National Forest planning process and is disclosed in this EIS. The recommendations on the suitability or unsuitability of the Piedra, the West Needle, and the South San Juan Expansion Wilderness Study Areas will be documented in the ROD for the San Juan National Forest Plan.

Also, because of the need for uniform management direction on designated wildernesses which are on more than one Forest, this draft EIS develops alternatives and discloses the effects of alternatives for management direction of an entire wilderness. This will be done for the following wildernesses:

Name	Net N.F. Acres	Administrative Unit
Lizard Head Wilderness	21,400	San Juan N. F.
Lizard Head Wilderness	18,600	Uncompahgre N. F.
	40,000	
Weminuche Wilderness	294,284	San Juan N. F.
Weminuche Wilderness	168,940	Rio Grande N. F.
	463,224	
South San Juan Wilderness	45,000	San Juan N. F.
South San Juan Wilderness	88,463	Rio Grande N. F.
	133,463	

The development and evaluation of alternatives and identification of the proposed management is a cooperative effort between the affected Forests. This is to accomplish and ensure uniform analysis and decisions for each wilderness, although each Forest will continue to administer their own portion of the wildernesses.

The decisions for the entire Lizard Head, Weminuche and South San Juan Wildernesses will be documented in the ROD for the San Juan National Forest. The decisions disclosed in the ROD will then be incorporated into the Rio Grande and the Uncompahgre National Forests' Plans.

An environmental impact statement is not a decision document. It is a disclosure document dealing with the environmental consequences of implementation of the proposed action and alternatives to the proposed action. It is an important document for Federal, State, and local governments to use in arriving at their individual decisions regarding the proposed action and alternatives to it.

The environmental consequences of the proposed action and alternatives on lands and activities administered by the San Juan National Forest, as well as other Federal, State, and local agencies are disclosed in this draft EIS. Other Federal, State, and local agencies have assisted in disclosure of environmental consequences and development of alternatives to the proposed action. Agencies which cooperated in the preparation of this document are listed in Chapter VI, Consultation and Mailing List.

Appendix A of this draft EIS is a glossary of terms used in this document and the Forest Plan. The reader may find it useful to refer to the glossary. Appendix B contains a list of references consulted in preparing the Forest Plan and draft EIS.

VICINITY OF THE FOREST

The San Juan National Forest encompasses 1,867,782 acres of National Forest System lands in southwestern Colorado (see Figure I-1); it is an administrative unit of the Rocky Mountain Region of the Forest Service, U. S. Department of Agriculture. Portions of this Forest lie within La Plata, Montezuma, Dolores, San Juan, Archuleta, San Miguel, Hinsdale, Mineral, Conejos and Rio Grande Counties.

SCOPE OF THE ISSUES TO BE ADDRESSED

In the initial phase of the planning process, issues and concerns were identified through a review of past public involvement efforts. When the review was completed, Federal, State, and local agencies and the public were asked to validate existing issues and define new issues. These public issues and management concerns established the scope of the EIS (40 CFR 1501.7 and 1508.25).

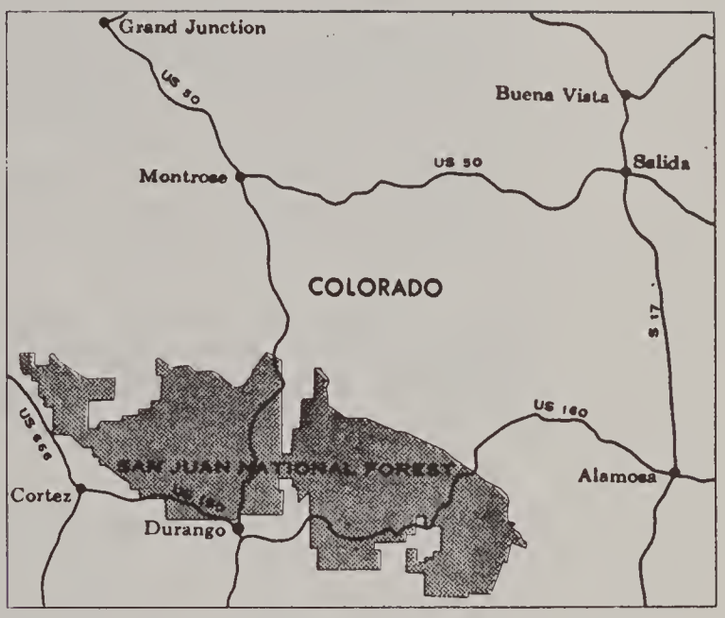
Various factors are involved in planning for management of the Forest in order to resolve these issues and concerns. One important factor is the ability to produce goods and services within the context of a limited land base and limited financial resources. Another factor is the ability to meet the demands of various publics, while simultaneously maintaining protection of soil and water. Often, issues and concerns are in opposition to one another.

Public issues and management concerns were grouped according to similar content. From these groupings, twelve planning questions were developed to represent the major public issues and management concerns that the Forest Plan would be directed to resolve. How each planning question is addressed by the Forest Plan also determines the manner in which the issues and concerns are addressed. A detailed discussion of this process can be found in the Planning Action 1 Report, "Public Issues, Management Concerns, Management Opportunities and Management Prescriptions for the Forest Plan."

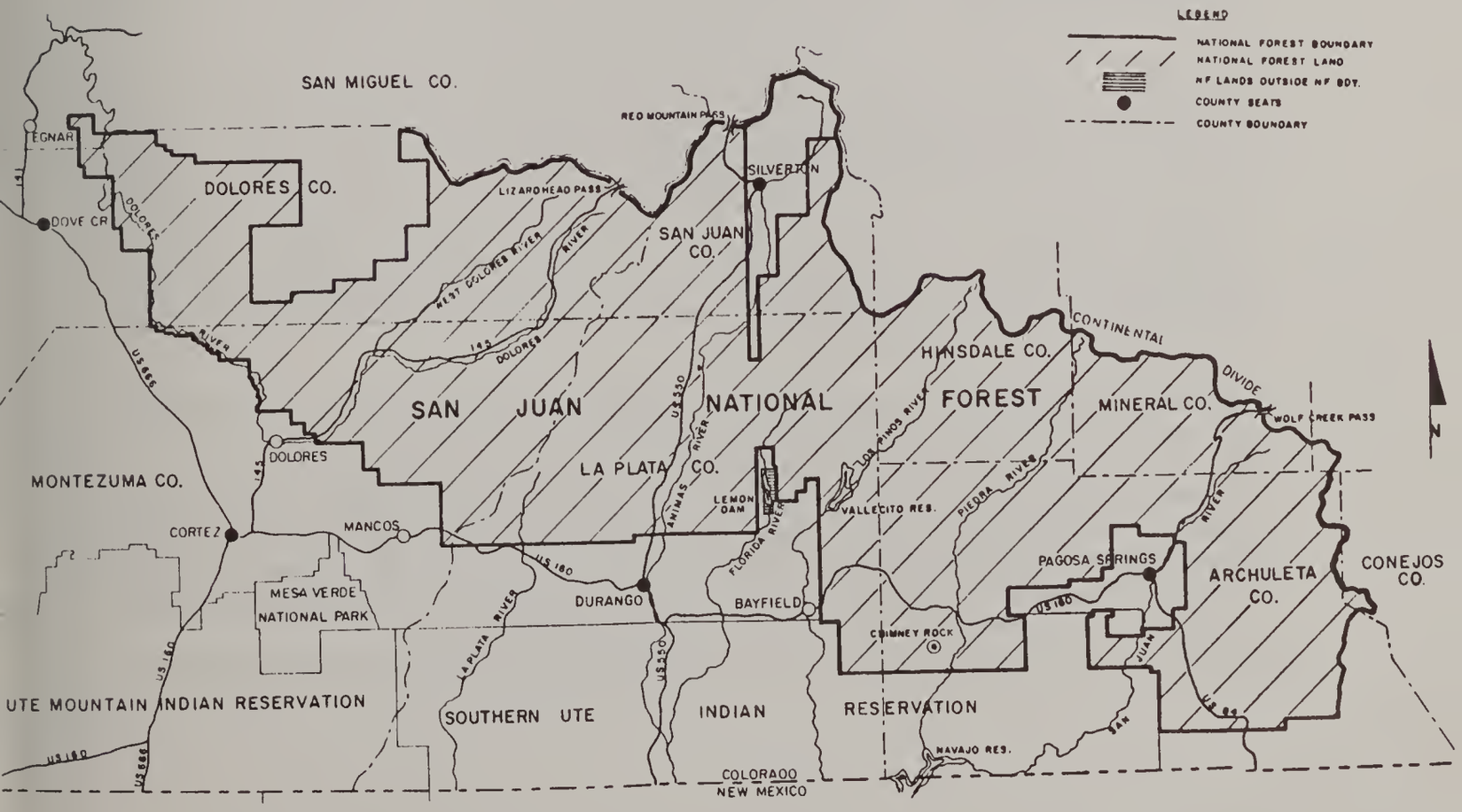
FIGURE I-1
VICINITY MAP

Region 2, Forest Service,
United States Department of Agriculture





SAN JUAN NATIONAL FOREST



The issues and concerns included under each planning question are summarized below.

PLANNING QUESTION 1: How should the San Juan National Forest be managed to provide a broad spectrum of dispersed recreation opportunities?

The major issues related to this planning question originate from the conflict between non-motorized dispersed recreation and other uses of the Forest such as livestock grazing and dispersed motorized recreation.

PLANNING QUESTION 2: What is the appropriate role of the San Juan National Forest in providing campgrounds, interpretive sites, picnic areas and rest stops?

The major issues and concerns related to developed recreation center around the lack of certain types of facilities in various areas, too many or too few sites, and the role of the National Forest versus the private sector in supplying developed recreation opportunities.

PLANNING QUESTION 3: What resources and uses should be allocated to downhill skiing on the San Juan National Forest?

The issues and concerns relating to winter sports sites, specifically downhill skiing, range from no increase in capacity to a large increase. There are additional issues related to the high cost and crowded conditions of ski areas as well as a concern over the possible effects that future ski areas may have on local communities.

PLANNING QUESTION 4: How much designated wilderness should the San Juan National Forest have and how should it be managed?

Currently 360,684 acres on the Forest have been designated wilderness by Congress. These existing wildernesses include an additional 276,003 acres on the Rio Grande and Uncompahgre National Forests. The Wilderness Act of 1964 and the Colorado Wilderness Act of 1980 specify how these areas are to be managed for the protection of their wilderness values. However, specific issues need be resolved concerning the details of managing wilderness use. In addition, recommendations must be made as to the suitability or unsuitability for wilderness for three Wilderness Study Areas on the Forest.

PLANNING QUESTION 5: What kind of transportation system is necessary to serve future resource management and public needs?

Several issues and concerns relate to transportation system needs on the Forest. The majority of these specifically deal with roads. Broadly interpreted, they indicate that the Forest needs to do a better job of travel management with regard to road closures, off-road vehicle use, access, and a more effective road maintenance program.

PLANNING QUESTION 6: How should the San Juan National Forest manage its tree resources?

The issues in this planning question generally relate to the amount of timber harvesting on the Forest. Harvest methods, such as clearcutting, are also an issue. Other issues and concerns relate to economic efficiency, the effects of timber cutting on local communities, conflicts with other uses, the type of products cut, and the impacts that timber harvesting may have on other resources.

PLANNING QUESTION 7: What is the role of the San Juan National Forest in providing wildlife habitat?

Most of the issues and concerns indicate that the Forest needs to increase its activity in wildlife habitat management. However, other issues point to conflicts between wildlife and other resource uses such as grazing. The current "snag" policy and its impacts on firewood gathering also surfaced as issues.

PLANNING QUESTION 8: What is the role of the San Juan National Forest in providing for grazing of domestic livestock?

The issues and concerns involving grazing are directed mostly toward conflicts with other uses, such as recreation, and toward the unacceptable impacts of overgrazing in certain areas along with its effects on soil, water, and riparian areas. Comments were also received indicating the need for National Forest System land for livestock grazing.

PLANNING QUESTION 9: How should the San Juan National Forest respond to the increasing demands for high quality water?

Almost all issues and concerns related to water resources are directed to the need for more water, higher quality water, or correction of unacceptable impacts occurring from such uses as grazing, mining, and road construction.

PLANNING QUESTION 10: What is the role of the San Juan National Forest in regard to the identification, protection, and use of cultural resources?

Most issues and concerns generally express that the Forest needs to accelerate efforts to identify (inventory), assess the significance of, protect, and develop suitable archaeological and historical sites for recreation and archaeology research. Some issues and concerns indicate that the Forest goes too far in protecting cultural resource sites; other issues and concerns indicate that cultural resource sites should be developed.

PLANNING QUESTION 11: How should the San Juan National Forest respond to mineral resource development?

Most mineral related comments expressed the need for controlling adverse surface resource impacts while at the same time being responsive to the Nation's need for minerals. Oil, gas, and geothermal leasing, exploration, including geophysical investigations, and development within wildernesses and Wilderness Study Areas were identified as activities adversely affecting the environment and wilderness character.

PLANNING QUESTION 12: How should the San Juan National Forest respond to the increasing demand for special uses and land adjustments?

Many of the issues and concerns involving land uses relate to the lack of, or need for, access to the Forest, occupancy trespass, and detrimental impacts of land uses such as utility and road corridors.

The specific public issues and management concerns relating to each planning question are listed in Appendix C. The outputs and effects that were tracked and used to determine how well the planning questions were answered are discussed in Chapter II, Alternatives Including the Proposed Action, and in Chapter IV, Environmental Consequences.



II. alternatives including the proposed action

CHAPTER II

ALTERNATIVES INCLUDING THE PROPOSED ACTION

OVERVIEW

This chapter describes the full spectrum of alternatives explored in the planning process. The section, Criteria Used to Develop Alternatives, explains the regulations and requirements in both the National Environmental Policy Act (NEPA) and the National Forest Management Act (NFMA) governing development of alternatives. The section, Alternatives Considered and Eliminated from Detailed Study, describes the alternatives that were considered in the planning process and eliminated from detailed study, and gives reasons for their elimination. The section, Alternatives Considered in Detail, describes the range of alternatives considered reasonable for detailed analysis. This chapter concludes with Comparison of Environmental Effects, a summary of effects of the alternatives considered in detail.

CRITERIA USED TO DEVELOP ALTERNATIVES

National Environmental Policy Act (NEPA) regulations (40 CFR 1502.14) require rigorous exploration and objective evaluation of all reasonable alternatives to the proposed action including a "no action" alternative, as well as alternatives not within the jurisdiction of the agency. The NEPA regulations also require identification and discussion of alternatives eliminated from detailed study.

In the Forest Service planning process, an alternative is a particular combination of management prescriptions which covers all acres on a National Forest and which relates to an overall philosophy of management. An almost infinite combination of prescriptions is possible in formulating a reasonable range of alternatives for the Forest Plan.

The National Forest Management Act (NFMA) regulations [36 CFR 219.5(f)(1)] establish criteria for guiding the development of alternatives. These criteria are:

--Each alternative will be capable of being achieved.

--A "no action" alternative will be formulated that is the most likely condition expected to exist in the future if current management direction continues unchanged.

--Each alternative will provide for the orderly elimination of backlogs of needed treatment for the restoration of renewable resources as necessary to achieve the multiple use objectives of that alternative.

--Each identified major public issue and management concern will be addressed in one or more alternatives.

--Each alternative will represent, to the extent practicable, the most cost-efficient combination of management practices examined that can meet the objectives established in the alternative.

The NFMA regulations [36 CFR 219.5(f)(2)] also require that each alternative state:

--The condition and uses that will result from long-term application of the alternative.

--The goods and services to be produced, and the timing and flow of these resource outputs.

--Resource management standards and guidelines.

--The purposes of the management direction proposed.

In order to comply with NEPA regulations for rigorous examination of alternatives and the NFMA criteria for alternatives listed above, each alternative was developed step-by-step, using information derived from the NFMA planning process.

In addition to the alternatives developed through the NFMA planning process, other alternatives were considered in response to NEPA requirements. These included alternatives derived from attempting to maximize outputs, as well as other alternatives that are realistically beyond the jurisdiction of the Forest Service. They are discussed in the section entitled Alternatives Considered and Eliminated from Detailed Study.

The alternatives considered represent different sets of management prescriptions (a group of management practices) applied to specific land areas to produce different arrays of outputs, goods, and services. The set of available management prescriptions is the same for all alternatives; however, alternatives differ in the number and distribution of acres allocated to each prescription. The Prescriptions for the Management Areas of the Preferred Alternative are found in Chapter III, Management Direction of the proposed Forest Plan. Management prescriptions used in the formulation of alternatives, but not applied in the preferred alternative, are described in Appendix D of this document.

The Formulation of Alternatives (Planning Action 5) is the culmination of Planning Actions 1 through 4 of the NFMA planning process. A summary of steps used on the San Juan National Forest to complete Planning Actions 1 through 5 is described below.

Step 1 Major public issues were identified through public involvement efforts. Management concerns were also identified through an internal analysis.

Step 2 Public issues and management concerns were consolidated into a set of general planning questions which would guide subsequent steps. A summary of the public issues and management concerns listed by "Planning Question," along with "Management Opportunities" to resolve the issues and concerns, is contained in Appendix C.

Step 3 Multiple use management prescriptions, representing sets of compatible management practices, were developed to answer planning questions.

Step 4 Individual resource inventories were completed to identify site-specific areas having common environmental characteristics. Data was collected and stored in the Forest resource data base.

Step 5 Appropriate locations for applying the management prescriptions were identified through site-specific capability and suitability analysis.

Step 6 Potential production levels, which reflect the environmental response of the land to management prescriptions, were estimated for each resource.

Step 7 Potential demand and supply levels were estimated for the various resource activities. Indications of the need to change management direction as well as opportunities to change future emphasis were identified.

Step 8 Alternative direction statements were formulated to provide a broad range of orientations for future management of the Forest. These alternatives address the needed changes in direction without exceeding the identified capabilities of National Forest System lands. Each alternative "answers" the planning questions in different ways.

Step 9 Constraints for each resource output were quantified by translating broad direction statements for each alternative into specific estimates of the maximum or minimum level of goods and services to be produced.

Step 10 A linear program model (FORPLAN, see Appendix E) was used to estimate the goods and services that could actually be produced by each alternative. The model is a mathematical process that determines the most cost-efficient mix of prescriptions which achieves a desired goal. The model projects outputs and costs over time.

Step 11 Validation of resulting projections and placement of management prescriptions on the ground was carried out by Forest personnel, based on their knowledge of on-the-ground conditions. This process included placing prescriptions with timber production objectives on the most highly productive commercial timber lands. Unacceptable management conflicts in the allocation were reconciled through interaction between the management team and staff specialists.

Step 12 The resulting mapped allocation was re-analyzed using the FORPLAN model to test the original constraints and to insure maximum economic efficiency of the alternative.

Step 13 Steps 9 through 12 were repeated as necessary to arrive at an acceptable set of alternatives which produces the desired outputs and meets the established direction.

A variety of alternatives was considered in the planning effort. These can be grouped into one of two categories: those considered and eliminated from further study, and those considered in detail. There were eight alternatives considered in detail. Those considered and eliminated from further study were grouped into four subsets: benchmark levels, constrained and unconstrained maximum alternatives, those which depart from the base timber sale schedule, and output alternatives.

ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY

This section deals with alternatives that were considered and subsequently eliminated from further study. Below is a discussion of each alternative and the reason it was eliminated from further study.

BENCHMARK LEVELS

Benchmark level analyses were done to derive reference points against which Forest alternatives can be compared, and to define the range within which feasible alternatives can be constructed. Benchmark levels are the results of a systematic objective analysis oriented toward defining the available decision space.

Benchmarks also provide a basis for analyzing trade-offs between alternatives. Benchmarks were not used to analyze the constraints imposed by laws and regulations. These were considered and found not to be significantly related to issues and concerns.

Of the benchmarks described below, all have been eliminated from further study. The reasons that each benchmark was not considered in a more detailed analysis are given in the discussions of individual benchmarks. Appendix H summarizes benchmark level analyses: It displays the parameters used to model benchmark levels, as well as the constraints and assumptions involved; the economic parameters associated with each benchmark; and the resource outputs resulting from each benchmark level.

Minimum Level (Benchmark #1)

The purpose of the minimum level benchmark is to estimate naturally occurring outputs and costs of maintaining the Forest as part of the National Forest System, so controllable outputs and discretionary costs can be identified. Minimum level is a Forest-wide management strategy that would meet only the following statutory requirements: administration of unavoidable non-discretionary land uses, prevention of impairment of the productivity of the land, and protection of the life, health, and safety of incidental users. The sum of these activities defines the long-term fixed costs of public ownership.

The minimum level benchmark was eliminated from further study because it does not conform to existing legislation governing management of the Forest, nor does it satisfactorily address issues and concerns. Although eliminated from further study, the benchmark does provide a base for comparing the incremental costs and benefits of those alternatives considered in detail. This ensures that the economic parameters used in evaluating alternatives are the result of a true marginal analysis in which fixed benefits and costs are not a factor.

The minimum level benchmark is conceivably implementable by applying minimum level management to all areas of the Forest. This benchmark was not modeled in FORPLAN, and therefore, no model parameters are given. Outputs and costs under this benchmark level were estimated by resource specialists.

Maximum Present Net Value - Market Outputs (Benchmark #2)

This benchmark level derives from management direction which would maximize the present net value of only those outputs having an established market price. On this Forest, those outputs include timber, livestock, and developed recreation. Dollar values used in the economic analysis are based on a "willingness to pay" for those resources, which differs from the price actually charged in some instances. RPA values served as surrogates for willingness to pay for both livestock forage and developed recreation. The values for timber were based on actual data from timber sale reports over the past five years. Prices were calculated for each of the major species categories on the Forest.

The land allocation associated with this benchmark is capable of being implemented, meets the requirements of existing laws and regulations, and will not impair the long-term productivity of the land. Policy-type constraints, such as non-declining flow, specific rotation lengths, and old-growth retention guidelines, were not applied, nor were budget or output constraints. One exception to this is that timber harvest in the first decade was constrained to be at least 80 percent of the current level. In subsequent decades, the volume was permitted to fluctuate up or down to a level no more than 25 percent of the harvest in the previous decade. Output capacity in excess of the level of consumptive trends was not valued in the economic analysis. The specific parameters used in the FORPLAN model for this benchmark are shown in Appendix H.

This benchmark was not considered in detail due to the relatively low water yield and livestock forage outputs that result. Livestock forage is below minimum acceptable levels in the first decade, whereas water yield approaches minimum level throughout the first 40 years.

Maximum Present Net Value - Market and Non-market Outputs (Benchmark #3)

This benchmark level derives from the set of management direction which would maximize the present net value of all outputs having an assigned monetary value. These outputs include timber, developed and dispersed recreation, range, water, wildlife, and fish. Dollar values are based on a "willingness to pay," for which RPA values serve as a surrogate for all outputs except timber. Timber values were calculated based on historical data.

The land allocation for this benchmark is capable of being implemented, meets the requirements of existing laws and regulations, and will not impair the long-term productivity of the land. Policy-type constraints, such as non-declining flow, specific rotation lengths, and old-growth retention guidelines, were not applied, nor were budget or output constraints. One exception is that timber harvest in the first decade was constrained to be at least 80 percent of the current level. In subsequent decades, the volume was permitted to fluctuate up or down to a level no more than 25 percent of the harvest in the previous decade. Output capacity in excess of the level of consumptive trends was not valued in the economic analysis. The specific parameters used in the FORPLAN model for this benchmark are shown in Appendix H.

This benchmark was not considered in detail because of the declining timber volume that is produced. Beginning in the second decade, harvest volume falls below minimum acceptable levels and remains below 26 million board feet per year for the remainder of the 200-year planning horizon. This would have extremely detrimental effects on the established timber industry in the area. Nevertheless, this benchmark was used as a standard from which to evaluate the present net values of alternatives considered in detail. This evaluation is shown in Table II-3 at the end of this chapter. Differences in the present net values between Benchmark #3 and the alternatives considered in detail reflect the "opportunity costs" associated with those constraints imposed upon the alternatives to bring them in line with their stated philosophy, goals, and objectives.

Maximum Timber Level (Benchmark #4)

This benchmark derives from the set of management direction which would maximize the production of timber subject to minimum standards of laws and regulations and without impairing the productivity of the land. A single resource emphasis is used to determine the actual biological potential of the Forest to produce timber. The resulting schedule of timber flows over time is the maximum that could be produced in the first decade subject to, at most, a 25 percent variation per decade thereafter. A second step of the analysis involved holding this maximum level of timber volume constant for 20 decades and determining the most cost-efficient set of prescriptions that could be used to achieve it.

Policy-type constraints, such as non-declining flow, specific rotation lengths, and old growth retention guidelines, were not imposed in this benchmark analysis, nor were budget or output constraints. Inventory constraints were imposed to ensure that soil and water productivity was not impaired. All land area classified as capable, suitable, and available for timber production was included. Output capacity in excess of the level of consumptive trends was not valued in the economic analysis, and prices were based on a surrogate for "willingness to pay," which were 1980 RPA values for all outputs except timber. The specific parameters used in the FORPLAN model for this benchmark are shown in Appendix H.

This benchmark was not considered in detail because of the unrealistic levels of output that are produced, with associated unrealistic budget requirements. Timber harvest in the first decade is over 200 million board feet per year, compared with a current production of approximately 40 million board feet per year. Costs required to construct the necessary roads, prepare and administer the sales, and reforest the cutover land are proportionately high as well.

Maximum Range Level (Benchmark #5)

This benchmark derives from the set of management direction which would maximize the production of livestock forage subject to minimum standards of laws and regulations and without impairing the productivity of the land. A single resource emphasis is used to determine the actual biological potential of the Forest to produce livestock forage. The resulting schedule of forage levels over time is the maximum total amount that could be produced over the first five decades. Timber was constrained in the first decade to a level at least 80 percent of the current volume, and thereafter it was not allowed to vary more than 25 percent from the harvest in the previous decade. Otherwise, no output or budget constraints were imposed, nor were policy-type constraints such as non-declining flow, specific rotation lengths, or old-growth retention guidelines. A second step of the analysis involved holding these maximum levels of livestock forage constant for five decades and determining the most cost-efficient set of prescriptions that could be used to achieve them.

All land area classified as capable, suitable, and available for livestock production was included in the analysis. Prices used were based on 1980 RPA values which served as surrogates for "willingness to pay" values. Output capacity in excess of consumptive trends was not valued in the economic analysis. The specific parameters used in the FORPLAN model for this benchmark are shown in Appendix H.

This benchmark was not considered in detail because of the extremely high costs involved with constructing and maintaining a road and trail system to manage the livestock. Livestock forage production in the first decade is approximately 330,000 AUM's per year compared to a current production of 170,000 AUM's per year. Road costs alone in the first decade would be approximately $8.5 million per year, compared to actual budgets in fiscal years 1979 and 1980 which were between $9 and $10 million per year.

MINIMUM ACCEPTABLE LEVEL ALTERNATIVE

This alternative establishes the minimum outputs and costs associated with meeting Regional Management Direction and Regional Acceptable Work Standards. It establishes an additional baseline for all alternatives considered in detail. All alternatives considered in detail, with the exception of the "reduced cost" alternative (Alternative D), have output levels for each resource equal to or greater than the minimum acceptable level for that particular output. These levels were determined by the Forest's Management Team, and were based on the following assumptions:

-Local dependent industries are to be maintained, to the extent possible, by Forest Service outputs.

-The present level of technology is expected to remain constant during the next ten years.

-Markets will be available for all outputs within the next ten years.

The outputs and costs associated with the Minimum Acceptable Level Alternative are shown in Table II-1. This alternative was eliminated from further study because it fails to adequately respond to public issues and management concerns. Although it is technically an acceptable alternative, it is minimally acceptable with respect to every output. Therefore, with relatively small increases in costs, significant increases in some outputs could be achieved, making every other acceptable alternative preferable to this one.

TABLE II-1

Minimum Acceptable Level Alternative Supply Potentials and Costs

		Period					
Average Annual Output or Cost	Units	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
Dispersed Recreation	MRVD	1110.0	1225.0	1350.0	1495.0	1650.0	1735.0
Off-Road Motorized Use	MRVD	70.0	80.0	90.0	95.0	105.0	110.0
Downhill Skiing	MRVD	165.0	195.0	260.0	315.0	365.0	385.0
Elk Winter Range Carrying Capacity	MAUM	13.0	13.0	13.0	13.0	13.0	13.0
Deer Winter Range Carrying Capacity	MAUM	16.8	16.8	16.8	16.8	16.8	16.8
Livestock Forage	MAUM	165.7	161.7	153.2	144.7	136.2	127.7
Timber	MMBF	26.0	26.0	26.0	26.0	26.0	26.0
Water Yield	MM Acre-feet	2.5	2.5	2.5	2.5	2.5	2.5
Costs	M $	3,847	3,847	3,872	3,898	3,923	3,949

UNCONSTRAINED MAXIMUM ALTERNATIVES

Unconstrained maximum alternatives are defined as those alternatives producing the highest possible level of selected outputs. The purpose of considering each alternative is to identify the opportunity cost of maximizing one resource or combination of resources at the expense of others. Only three maximum alternatives were formulated: these were to determine the biological potential for timber production; the maximum possible level of downhill skiing on the Forest; and the maximum amount of area available for minerals leasing with surface occupancy.

Timber

The unconstrained maximum timber alternative assumes that the entire San Juan National Forest is in a fully regulated condition with an even distribution of age classes. It further assumes that all forest land capable of timber production, including designated wilderness, is available for timber production. Under these circumstances, 217.6 million board feet (MMBF) of timber could be produced each year, at a cost of approximately $12,290,000 per year, not including capital investments for roads.

This alternative was eliminated from further study because it represents a response to only one issue, timber, and because implementing the alternative would violate several laws, including NFMA, the Multiple Use-Sustained Yield Act of 1960, and the Wilderness Act of 1964.

Downhill Skiing

The unconstrained maximum downhill skiing alternative assumes that all potential sites rated "marginal" or better on the Forest would be developed and become operational. This would increase total skier capacity from a current 3,580 PAOT to 48,280 PAOT. The additional sites that would be developed are listed below:

East Fork
Windy Pass
Dunton
Echo Basin
Grayrock-Cascade
Barlow Creek
Flat Top Mountain
Freeman Park
Lion Head
Pagosa Peak
Sultan Mountain
Lost Creek
Nary Draw

Annual administrative costs of this alternative would be approximately $345,000 in the year 2030.

This alternative was eliminated from further study because it represents a response to only one category of issues relating to limited types of winter sports activities. Furthermore, before a ski area can be developed, not only does an appropriate site have to be available, but there must also be willing investors in the private sector with capital to make a development operational. At present, there is an expressed interest by the private sector in only three of these sites: East Fork, Windy Pass, and Grayrock-Cascade.

Minerals Leasing

The unconstrained mineral leasing alternative assumes that all areas on the San Juan National Forest and all wilderness areas under shared management on the Rio Grande and Uncompahgre National Forests are available for mineral leasing. The following acreages would be open to a full range of exploration and development activities:

Unclassified lands:	1,393,689 acres	
San Juan N.F. Wilderness:	360,684 acres	
Wilderness Study Areas:	90,100 acres	
Other classified lands:	23,309 acres	
Net San Juan N.F. lands:	1,867,782 acres	100% of San Juan N.F.
Shared Wilderness:	276,003 acres	
Total available lands:	2,143,785 acres	100% of shared management lands

Implementation of this alternative would have the following effects:

In unclassified Forest land, 106,478 acres (eight percent of unclassified Forest land) presently identified as having a low potential for successful reclamation would be made available for exploration and development activity. An additional 460-acre (less than one percent) tract which is potentially reclaimable but is entirely surrounded by land with low reclamation potential would be available for leasing. Development of "island" lease areas would cause extensive surface impacts, including access roads, pipelines, electric transmission lines, and geophysical activity, to surrounding lands with low reclamation potential.

In designated wilderness areas where management is shared by the San Juan, Rio Grande, and Uncompahgre National Forests, 518,204 acres (81 percent) having a low potential for restoration to natural conditions would be made available for exploration and development activity. Additional "island" lands as described above, totalling 43,302 acres (seven percent) would be available for leasing, which could cause impacts to surrounding lands from surface access and development facilities.

In Wilderness Study Areas, 59,665 acres (66 percent) with low potential for restoration would be available for leasing; an additional 8,600 acres (nine percent) of "island" lands would be available for leasing with impacts to surrounding lands.

In other classified National Forest land (Wild and Scenic Rivers Study, Research Natural Area, Archaeological Area), 23,309 acres (100 percent) of land on which mineral exploration and development would be detrimental or destructive to the special values of the classified area, would be available for leasing.

This alternative was eliminated from further study because it represents a response to only one issue, mineral leasing, and because implementing the alternative would violate several laws, including the Minerals Leasing Act of 1920, the Wilderness Act of 1964, and the Colorado Wilderness Act of 1980. These Acts require protection, reclamation, and/or restoration of lands disturbed by mineral activites; implementation of this alternative would not allow the required protection to be applied to the lands identified above.

CONSTRAINED MAXIMUM ALTERNATIVES

Constrained Maximum Alternatives display the maximum amount of a selected output that can be produced subject to the production of minimum acceptable levels (See Table II-1) of all other outputs. Constrained maximum alternatives were developed for the outputs of dispersed recreation, wildlife and fish, livestock forage, timber, and water. Each alternative is discussed separately below.

All constrained maximum alternatives were eliminated from detailed study. The philosophy under which they were formulated was oriented toward maximizing particular outputs. Output levels associated with constrained maximum alternatives may be similar to those of alternatives considered in detail; however, there is a significant difference in the resulting allocations. This is because constrained maximum alternatives are not necessarily composed of the most cost-efficient set of management prescriptions to meet the desired objectives. They were formulated with a "maximize output" objective rather than a "maximize economic efficiency" objective. This violates the regulations governing National Forest management.

Constrained Maximum Recreation

The maximum amount of recreation that could be produced, subject to minimum acceptable levels of all other outputs, is shown below. For downhill skiing an assumption was made that all five potential ski areas rated "good" or better would be developed. These sites are East Fork, Windy Pass, Dunton, Echo Basin, and Grayrock-Cascade.

Thousand Recreation Visitor Days Per Year

Recreation Type	Current Use	Constrained Maximum
Total Dispersed	878	24,010
Off-road Motorized Dispersed	63	1,730
Downhill Skiing	138	1,250

Constrained Maximum Wildlife and Fish

The maximum winter range carrying capacity for elk and deer, subject to minimum acceptable levels of all other outputs, is shown below:

Winter Range Carrying Capacity (Numbers of Animals)

	Current Use	Constrained Maximum
Winter Range Carrying Capacity - Elk	12,800	19,100
Winter Range Carrying Capacity - Deer	16,400	36,600

Constrained Maximum Range

The maximum output of domestic livestock forage, subject to minimum acceptable levels of all other outputs, is 217,600 animal unit months per year compared to the current level of 170,200 animal unit months per year. This increase would result from high investments in range improvements and intensive range management practices.

Constrained Maximum Timber

The maximum timber that could be produced, subject to minimum acceptable levels of all other outputs, is 96.4 million board feet per year through the year 2030, compared to current production of 33.8 million board feet of green timber per year. This alternative assumes that only available, capable, and suitable timber producing lands are managed for timber.

Constrained Maximum Water

The maximum water that could be produced, subject to minimum acceptable levels of all other outputs, is approximately 2.6 million acre-feet per year compared to a current yield of 2.5 million acre-feet. This alternative assumes that the high water yield prescription is applied on all suitable areas, including spruce-fir and mixed conifer capable forest land. Increased water yield results mainly from vegetation manipulation (primarily small clearcuts) in commercial and non-commercial stands and snow fences in montane meadows and alpine areas. These treatments increase water yield by decreasing transpiration and increasing redistribution of snow (and thereby runoff) in clearcut openings and the lee side of snow fences.

Constrained Maximum Water Meeting Quality Standards

Of the 2.5 million acre-feet now produced by the Forest, the maximum water volume meeting established standards that could be produced subject to minimum acceptable levels of all other outputs, is approximately 1.99 million acre-feet per year. The remaining .51 million

acre-feet would not meet established standards. Of the current output only 1.85 million acre-feet meets water quality standards. Increases result from treatment of mine acid drainage problems, as well as recovery of watersheds presently violating sediment standards.

DEPARTURE FROM BASE SALE SCHEDULE ALTERNATIVE

Departures are defined as alternatives which deviate from the principle of non-declining even-flow through a planned decrease in the timber sale and harvest schedule at some time in the future. The purpose of analyzing departures is to investigate the possibility that net public benefits can be maximized through departures from the base sale schedule of the original alternatives.

Departures may result in increased net public benefits when one or more of the following conditions occur on a National Forest:

--high mortality losses from any cause can be significantly reduced or prevented;

--timber age or size class distribution can be improved, thereby, facilitating the attainment of forest growth at its long-term sustained yield capacity;

--implementation of the corresponding base sale schedule would cause a substantial adverse impact upon a community in the economic area in which the National Forest is located;

--none of the alternatives being considered provide a base sale schedule that achieves the goals of the RPA Program; and

--other management concerns, public issues, and opportunities suggest a departure as a viable alternative.

Departure opportunities are also to be analyzed as a means to attain 90 percent of the annual growth rate at long-term sustained yield.

Of the conditions described above, only the first and second are applicable to the San Juan National Forest at the present time. No adverse community impacts are anticipated under the base sale schedule of any of the alternatives considered in detail. Furthermore, at least one of the alternatives considered in detail provides a base sale schedule that achieves the goals of the RPA Program. There are no outstanding public issues, management concerns, or opportunities which would mandate a departure alternative at this time.

A departure alternative was formulated and analyzed for each alternative considered in detail. Each of these alternatives has the same budget and output constraints as the original alternative. An additional constraint imposed was that the long-term sustained yield capacity of the original alternative also be achieved in the departure. All departures were run through the FORPLAN model under the objective function of

maximizing present net value for five decades. Although the same range of management prescriptions served as input to the departure analysis, the model was allowed to vary the period of implementation of these prescriptions in order to best meet the objectives of the departure analysis. Forest-wide timber volume in the first decade was constrained in the departure to a level at least as high as that in the original alternative. In subsequent decades, no minimum volume constraint was specified, although harvest volume in any decade was not allowed to vary by more than 50 percent of the harvest in the previous decade.

The results of the departure alternatives are shown in Appendix F. Timber harvest volumes are shown for each alternative considered in detail as well as its associated departure.

At this time, all of the departure alternatives have been eliminated from further study for the San Juan National Forest. Considering the anticipated demands in the area for timber, as well as local market conditions, existing mill capacity, and the high roading requirements of accessing a large amount of timbered area in early decades, a departure alternative is not warranted. Nevertheless, departure alternatives do have the potential of reducing mortality and improving age class distribution. Should the market for timber improve significantly in the future, an additional analysis needs to be made to determine the appropriateness of a departure from the base sale schedule.

OUTPUT ALTERNATIVES

Output alternatives were generated in order to be able to focus on a single type of output in a given alternative. Two types of outputs were investigated, market and non-market. Market outputs are defined as those which have the potential to produce income to the government. Examples include timber, range, and developed recreation. Non-market outputs are those associated with the production of amenity values, including water, dispersed recreation, wildlife and fish. Of the output alternatives considered in the planning process, the "Non-market Opportunities" alternative was considered and eliminated from further study. This will be discussed below. The "Market Opportunities" alternative (Alternative B) was considered in detail and is discussed in the following section.

Non-market Opportunities Alternative

This alternative derives from management direction which maximizes present net value while emphasizing non-market commodities such as water, dispersed recreation, wildlife, and fish. Management for other resources is at economically and environmentally feasible levels consistent with the emphasis on amenity values. No budget constraints were imposed, and prices used in the economic analysis were based on a "willingness to pay." RPA values for 1980 served as surrogates for willingness to pay for all outputs except timber. The outputs valued were timber, developed and dispersed recreation, livestock forage, and water. Unused output capacity was not valued, and timber flow was

constrained by the application of a non-declining yield policy. All Wilderness Study Areas were allocated to wilderness management to enhance the availability of amenity values associated with wilderness.

This alternative was eliminated from further study because output levels in the early decades are not sufficient to meet the needs of the local timber and livestock industry. Timber harvest volume is only 10 MMBF per year during the first three decades compared to a "minimum acceptable" volume of 26 MMBF per year. Livestock grazing use falls short of minimally acceptable levels by approximately 32,000 AUM's per year during the first decade and 9,000 AUM's per year during the second.

Table II-2 displays various outputs and activities by time period for the "Non-market Opportunities" alternative. This alternative has an incremental present net value of $226.5 million, compared to Benchmark #3, which has an incremental present net value of $334.0 million.

ALTERNATIVES CONSIDERED IN DETAIL

Each of the alternatives described in this section meets the requirements of the NFMA regulations. Each alternative is to be achievable, and all alternatives discussed in this section meet this criterion. Output levels are below maximum supply potentials, yet satisfy the Forest-wide Management Requirements for all resources. Forest-wide Management Requirements are found in Chapter III, Management Direction, of the proposed Forest Plan.

NFMA regulations require alternatives to address public issues and management concerns. To ensure this, alternatives were formulated so that each addressed, to at least some extent, the planning questions identified in the scoping process. Planning questions were directly linked to public issues and management concerns early in the planning process.

An additional requirement is that each alternative addresses projected demand conditions, supply capabilities, and local economic impacts. One way this was accomplished was through determination of minimum acceptable output levels prior to the formulation of alternatives. It was decided that for any alternative to be considered in detail it must produce at least the minimum acceptable levels of all outputs regardless of the emphasis of the alternative. (An exception to this rule was made for Alternative D as it was formulated to investigate the outputs that could be produced under a significantly reduced budget.) For example, although Alternative A emphasizes production of non-market outputs, it still produces minimum acceptable levels of timber and livestock forage. The intention is to ensure that none of the alternatives results in detrimental economic impacts, especially as they relate to established dependent industries in the area.

Projected demand conditions were incorporated into the formulation of alternatives by ensuring that output levels produced in any alternative do not exceed consumptive trend levels. In some situations, due to joint production functions, excess quantities of some outputs are produced, but these were not valued in the cost-efficiency analysis of that

TABLE II-2

Selected Outputs and Activities of the "Non-Market Opportunities" Alternative (Annual Units)

Output	Unit of Measure	Time Periods 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
RECREATION							
Dev. Rec. Use	MRVD	681	681	916	1121	1297	1367
Downhill Skiing	MRVD	294	294	364	424	478	503
Hunting, Big Game	MRVD	142	142	151	160	169	178
Hunting, Small Game	MRVD	25	25	27	29	31	33
Fishing	MRVD	209	209	222	235	248	261
Non-game Use	MRVD	15	15	16	17	18	19
Other Disp. Rec.	MRVD	1129	1129	1264	1399	1534	1659
Trail Const/Reconstruc.	MILES	62.5	62.5	62.5	62.5	62.5	62.5
WILDERNESS							
Wilderness Management	M Acres	450.8	450.8	450.8	450.8	450.8	450.8
Wilderness Use	MRVD	187	187	222	240	252	264
WILDLIFE AND FISH							
Wildlife Hab. Improvement	M Acres Equivalent Treated	67	67	77	86	100	102
RANGE							
Grazing Use (Livestock)	MAUM	132	132	144	145	146	146
TIMBER							
Programmed Sales Offered	MMBF	10.2	10.2	10.2	10.2	25.8	25.8
Reforestation	M Acres	.5	.5	0	.7	.2	3.4
Timber Stand Improvement	M Acres	8.4	8.4	8.4	8.3	8.3	6.7
WATER							
Water meeting Qual. Goals	M Ac. Ft.	1850	1850	1850	1890	1890	1890
Annual Average Yield	M Ac. Ft.	2496	2495	2494	2493	2491	2492
MINERALS							
Mineral Leases and Permits	No. of Operating Plans	296	392	454	520	606	612
HUMAN AND COMMUNITY DEVELOPMENT							
Human Resource Program	Enrollee Years	25	N/A	N/A	N/A	N/A	N/A
PROTECTION							
Fire Mgt. Effectiveness Index	$/M Acres	103	108	113	118	118	118
Fuel Breaks & Fuel Treatment	M Acres	4.2	4.2	4.2	4.2	4.2	4.2
LANDS							
Land Purchase and Acquis.	Acres	250	250	250	250	250	250
COSTS							
All Elements	M $	4591	4911	5094	4279	4461	3901
Capital Investment	M $	2329	1951	2077	1670	1758	1561
(Backlog)	M $	613	175	175	124	124	124
Total Appropriated Funds	M $	6920	6862	7171	5949	6219	5417
Allocated Funds	M $	141	75	75	75	75	75
TOTAL NFS	M $	7061	6937	7246	6024	6234	5492
PRESENT NET VALUE, Incremental	MM $	226.5					
BENEFIT-COST RATIO, Incremental	N/A	2.79					

alternative. From a supply standpoint, each alternative was formulated by attempting to first recognize how management of the Forest relates to production of the same resources by other governmental and private entities. The need to change management direction to correct shortfalls in local or Regional supply, as well as maintaining the opportunity to do so, were important considerations in the formulation of each alternative.

In many cases, constraints were imposed upon the FORPLAN model to accomplish the factors described above. In fact, varying the constraints within FORPLAN provided the main source of variability between alternative runs. By imposing a unique set of constraints on the model, it was possible to address the different emphases and goals embodied within each alternative. This resulted in a unique mix of management prescriptions and output flows for each alternative. The individual constraints used in each alternative run of FORPLAN, along with a rationale for each one, are listed in Appendix G.

Another requirement addressed in formulating alternatives is that each alternative must represent the most cost-efficient way of accomplishing the goals that were established for it. (See Chapter IV for a more detailed discussion of economic analysis, including those outputs valued in the planning process.) This involves the use of economics at several stages of the process. The first stage incorporating economic concepts was in formulating prescriptions. These comprise the building blocks of alternatives composed of specific management practices to be applied on specific vegetation areas. Although no sophisticated analytic techniques were used, the sets of management practices to be included in each prescription were formulated by resource specialists working in an interdisciplinary mode. Consideration was given to those practices that would best accomplish the stated objectives of the prescription. Where more than one practice was available, the most cost-efficient one was selected.

Economics also played an important role in selecting the mix of management prescriptions to be applied in each alternative. This was initially accomplished through the FORPLAN model, which was run under the objective function of maximizing present net value. Given that two prescriptions would both be able to satisfy the pertinent constraints to at least a certain extent, FORPLAN would select the most cost-efficient one.

Once FORPLAN produced a tentative allocation of prescriptions, members of the Management Team mapped it into a manageable Forest configuration. Once again, economic efficiency was a major criterion, especially as it relates to access, transportation system design, administrative costs, and placement of prescriptions on the most productive land to meet the objectives of the prescriptions (e.g., placing prescriptions with timber production objectives on the most highly productive commercial timber lands).

Economics therefore, has played a major role throughout the entire planning process. Although the alternatives considered in detail have different outputs, costs, and effects, each one represents the most cost-efficient way of meeting the goals specific to it. Throughout the process, alternatives were continually evaluated to assure compliance with the requirements of 36 CFR 219.13 and the Forest-wide Management Requirements. The minimum acceptable level was used as a guideline in selecting alternatives considered in detail. Each alternative considered in detail has also been evaluated for spatial and resource output feasibility as well as to ensure that the original intent of the alternative is being satisfied.

FORPLAN was also used to meet the requirements of the NFMA regulations for coordination of outdoor recreation, range, timber, water, wildlife and fish, and wilderness resources [36 CFR 219.12(b)(3)]. To achieve such multiple use coordination, each alternative must provide for an integrated mix of resource outputs rather than a combination that maximizes some outputs to the exclusion of others. Integration was achieved by ensuring that each alternative meets certain basic requirements, such as minimum acceptable habitat diversity and water quality. Some of these requirements were applied as constraints in the linear program model. Others appear as Forest-wide Management Requirements.

Associated with each alternative is a schedule of resource outputs over time. Outputs were projected for five 10-year periods from 1981 through 2030. Timber harvest was examined for an additional 15 decades to ensure non-declining yield of wood fiber production, as required by NFMA, 36 CFR 219.12(d)(1)(i).

Each of the eight alternatives described in this section was developed and analyzed through the NFMA planning process outlined in Chapter I. The proposed action is the "preferred alternative," Alternative H.

The difference between the various alternatives considered in detail is a function of both outputs, and application of prescriptions on the land. Two alternatives may have similar outputs, but be significantly different in terms of which prescriptions have been applied to the land. Conversely, two alternatives may be similar in allocation, but the timing of the prescriptions may be such that the outputs produced during a particular decade are significantly different. For this reason it is important to consider both aspects of the alternatives as comparisons are made.

Each of the eight alternatives considered in detail includes identification as to the suitability or unsuitability for wilderness of the three Wilderness Study Areas (WSA's) on the Forest. One point needs to be made concerning the West Needle Wilderness Study Area. This WSA is actually composed of two areas, one administered by the Forest Service and an adjacent area administered by the Bureau of Land Management (BLM). Wilderness suitability identifications made for the WSA include both the Forest Service and the BLM portions of the WSA. Based on an analysis of capability, which is more fully discussed in Chapter IV, a 1,240 acre area at the north end of the BLM portion of the WSA has been

determined incapable for wilderness because of use conflicts and administration problems associated with the Molas Lake area. Therefore, for those alternatives discussed below in which a "suitable" identification is made for the West Needle WSA, the suitability is exclusive of this northern portion.

In the descriptions of expected future conditions for each alternative, the standard of comparison is the present situation on the San Juan National Forest.

ALTERNATIVE A

Alternative A emphasizes opportunities to provide a variety of non-market outputs. Non-market outputs are those for which traditional buying and selling markets do not exist and include water quality, fish and wildlife, dispersed recreation, wilderness, visual quality, and other non-revenue producing outputs. In this alternative, emphasis is placed on high levels of non-market outputs while still providing minimum acceptable levels of market outputs necessary to maintain social and economic stability in the area surrounding the Forest.

The South San Juan Expansion, West Needle and Piedra Wilderness Study Areas are identified as suitable for inclusion in the National Wilderness Preservation System.

Alternative A has generally the same philosophy as the Non-market Opportunities Alternative that was considered and eliminated from detailed study. One major difference is that, although emphasis is still on non-market commodities, it has minimally acceptable levels of both timber and livestock outputs. Since the low level of timber and livestock forage was the main reason that the Non-market Opportunities Alternative was eliminated from further study, this alternative was formulated with basically the same intent, yet can be carried through the analysis procedure of being considered in detail.

Expected Future Condition

Three low use/high cost developed recreation sites are closed, but some new trailheads are constructed resulting in a slight increase in developed site capacity. In order for the predicted demand for camping within the area to be met, privately owned campground sites near the San Juan National Forest would have to be developed or expanded. Downhill skiing capacity is increased slightly through expansion of Purgatory and Stoner Ski Areas. No new sites are developed. Relatively few roads are constructed and total system road miles remain essentially the same. Total trail miles are increased slightly. Emphasis is placed on semi-primitive motorized and non-motorized as well as primitive recreation opportunities. New trailheads are constructed to accommodate any increases in dispersed recreation use.

Opportunities for archaeological research, protection, and preservation are high.

San Juan National Forest visitors have a variety of opportunities to view and enjoy scenery. The viewing experience is generally pleasant throughout the Forest; travel routes and use areas are enhanced through landscape enhancement practices along roads and special scenic view areas.

Existing wildernesses are managed under a direct user control system, such as requiring permits.

Fish habitat potential increases from present levels and wildlife habitats show improved diversity.

Range condition is generally satisfactory, and improves slightly over time, although actual grazing use declines over the next 50 years.

Wood resources (sawtimber, roundwood, fuelwood) are harvested in low amounts but are sufficient to meet the needs of local dependent industries, improve visual quality, and improve wildlife habitat. Large blocks of forested land exist which are not managed for timber production.

Water yield increases slightly due to a limited number of commercial timber operations and water quality is slightly improved over time.

Although minerals exploration and development continues, increased emphasis is upon protection of surface resources and mitigation of adverse environmental impacts. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the mineral leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE B

Alternative B is the second of two alternatives categorized as "output" alternatives. In this alternative, emphasis is placed on market outputs having the potential to produce income to the United States Treasury. These include timber, range, and developed recreation, including downhill skiing. The economic analysis of this alternative included dollar values for the same outputs valued in the other alternatives.

The West Needle, Piedra, and South San Juan Expansion Wilderness Study Areas are identified as unsuitable for inclusion in the National Wilderness Preservation System.

Expected Future Condition

Developed recreation site capacity is increased slightly, but only to accommodate heavy use at existing sites. A minor amount of campground reconstruction and some conversion of overnight facilities to day use occurs in response to demand. Opportunities are maintained to significantly increase downhill skiing capacity through expansion of Purgatory and Stoner and development of potential sites rated good or better. New

road mileage is constructed in response to the development of market resources, and therefore, additional semi-primitive motorized acres are available for road-oriented dispersed recreation, while semi-primitive non-motorized acres decrease. This increased capacity will meet the demands for less primitive forms of dispersed recreation. No new trailheads or trail mileage are constructed and the total trail miles maintained decline over time.

Cultural resources are identified and protected in accordance with existing laws and regulations.

The areas adjacent to major travel corridors are maintained in natural or near natural conditions, although distant areas viewed from these corridors reveal the management activities taking place. Landscape alterations are visible throughout the San Juan National Forest.

Wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except to disperse use and protect the resource.

Wildlife habitats show improved carrying capacity. However, extensive human use might preclude effective utilization of many of the improved habitats. Vertical diversity would be low as a result of the relatively small number of acres under uneven-aged management. Fish habitat improvement would be low.

Range condition is generally satisfactory and relatively stable, except in high activity areas such as timber sales and heavily used recreation areas. Grazing of livestock continues at high levels.

Wood resource outputs are available in amounts to meet the maximum projected needs of industry in balance with other commodities such as livestock production and developed recreation.

Water yield increases are moderately high due to heavy timber cutting. Many clearcuts are located and designed to specifically increase water yield. Water quality is reduced due to increased sediment yields.

Mineral exploration and development is facilitated by increased access. Protection of surface resources and environmental quality is ensured, in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the minerals leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE C

Alternative C emphasizes a mixture of market and non-market outputs. This emphasis would be achieved through modest increases in livestock grazing, wildlife habitat, skier capacity, wilderness, and visual quality. Dispersed and developed recreation capacity, timber volume, and water yield outputs would all be maintained at fairly constant levels.

The West Needle Wilderness Study Area is identified as suitable for inclusion in the National Wilderness Preservation System; Piedra and South San Juan Expansion Wilderness Study Areas are identified as unsuitable.

Expected Future Condition

All existing developed sites continue to be operated by the San Juan National Forest. An increase in developed recreation site capacity occurs because of trailhead construction. Additional development of overnight camping facilities on private lands might occur due to changes in demand within the area adjacent to the Forest. The opportunity is maintained to significantly increase downhill skiing capacity through expansion of existing ski areas and development of potential sites rated "good" or better. Few additional road miles are constructed with an eventual decrease in total road miles maintained. The capacity for primitive and semi-primitive recreation is increased, and could easily meet the demands for these opportunities. A limited number of trailheads are added to enhance primitive and semi-primitive experiences, although total trail miles slightly decrease over time.

Opportunities for archaeological research, protection, and preservation are high.

Areas adjacent to major travel corridors and use areas are maintained in natural or nearly natural conditions. Opportunities to view scenic areas or points of interest are provided through landscape enhancement practices such as turn-outs and scenic view areas. Evidence of management activities are visible in secondary use areas, but most are visually acceptable.

Existing wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except to disperse use and protect the resource.

Overall wildlife habitat conditions remain basically unchanged over time. Fish habitat and vertical diversity are improved slightly as additional areas come under uneven-aged management.

Range condition is generally high overall. Livestock grazing for all types of livestock remains fairly high.

Wood resource outputs are moderate and exceed the minimal needs of local industry.

Water yield is moderately increased slightly due to commercial timber operations. Water quality is slightly improved.

Minerals exploration and development is carried out, but is limited by available road access. Protection of surface resources and environmental quality is assured in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the minerals leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE D

Alternative D is a "reduced cost" alternative which emphasizes production of market outputs such as timber, livestock grazing, and mineral resources under reduced administrative regulation and a reduction in budget levels ranging from approximately 20 to 35 percent over the first five decades. This emphasis would be achieved by producing a mix of market and non-market outputs.

The West Needle, Piedra and South San Juan Expansion Wilderness Study Areas are identified as unsuitable for inclusion in the National Wilderness Preservation System.

Expected Future Conditions

Approximately 12 percent of developed recreation site capacity is eliminated by closing the least cost-efficient and lowest use camp and picnic grounds. Approximately half of the most cost-efficient sites are recommended for operation by concessionaires, and the remaining sites are operated at a reduced level by the Forest Service. Any demand in excess of available capacity could be met only by the private sector. Opportunities are maintained to significantly increase downhill skiing capacity through expansion of Purgatory and Stoner and development of potential sites rated "good" or better. Road-oriented dispersed recreation capacities are increased by the construction of additional road mileage, with the result that semi-primitive opportunities are reduced. There is no additional construction of trails or trailheads, although there is some trail reconstruction. However, total trail miles would decrease over time.

Cultural resources are identified and protected in accordance with laws and regulations, although opportunities for research and preservation are low.

Major travel routes and use areas are maintained in a visually acceptable condition. Areas viewed from travel corridors and use areas display evidence of some modification. Secondary travel routes and use areas show evidence of management activities that can be seen in most viewing zones.

Existing wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except to disperse use and protect the resource.

Wildlife habitats show improved carrying capacity. However, because of additional human activity and reduced administrative controls, overall habitat quality decreases over time. There would be no improvement in fish habitat. Vertical diversity would be slightly improved through uneven-aged timber management.

Range condition is generally satisfactory and will gradually show improvement. Livestock grazing continues at high levels.

Wood resource outputs are low and do not meet industry needs during the first decade but increase to meet industry needs thereafter.

Water yield is slightly increased due to a limited number of commercial timber operations. Water quality is maintained or slightly improved.

Minerals exploration and development occurs within the constraints of available access. Protection of surface resources and environmental quality is assured in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the minerals leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE E - RPA

Alternative E is an "RPA" Alternative. It emphasizes Regional goals for the Forest as described in the Rocky Mountain Regional Plan as well as the San Juan National Forest portion of the Resources Planning Act (RPA) 1980 Program targets. This emphasis would be achieved by managing all resources at a high level while still meeting Forest-wide Management Requirements for protecting resources. Resource outputs having no specific targets established in the RPA Program would be produced at minimally acceptable levels.

The West Needle and Piedra Wilderness Study Areas are identified as suitable for inclusion in the National Wilderness Preservation System; the South San Juan Wilderness Expansion Study Area is identified as unsuitable.

Expected Future Condition

All existing developed sites continue to be maintained by the Forest Service. An increase in developed recreation site capacity occurs because of trailhead construction. Opportunities are maintained to increase downhill skiing capacity through the expansion of existing ski areas and the development of up to three potential sites rated "good" or better. There is an increase in road-oriented recreation opportunities in certain areas due to the addition of timber access roads, although total road miles maintained across the Forest remain essentially the same. Overall dispersed recreation capacity is maintained at approximately the current level and is capable of meeting demand. New trails and trailheads are built to enhance primitive and semi-primitive recreation experiences. Total trail miles will decrease over time.

Cultural resources are identified and protected in accordance with laws and regulations, and there are a moderate number of opportunities for archaeological research and preservation.

Major travel routes and use areas have landscapes in natural, visually acceptable condition. Some opportunities to view points of interest and unique landscape features are provided. Management activities and visual modification are evident along many secondary travel routes.

Existing wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except those needed to disperse use and protect the resource.

Carrying capacity of wildlife habitats is increased; however, additional human uses preclude the effective utilization of some habitats. Fish habitat potential has been attained in the majority of the waters outside of wilderness. Vertical diversity is improved as a result of additional areas being placed under uneven-aged management.

Range conditions are satisfactory in most areas with a slightly upward trend. Livestock grazing is at a high level.

Wood resource outputs are low to moderate and meet the needs of present local industry.

Water yield is moderately increased due to commercial timber operations, a limited number of which are located and designed to increase water yield. Water quality is maintained throughout the five-decade period.

Minerals exploration and development is carried out, but is limited by available road access. Protection of surface resources and environmental quality is assured in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the minerals leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE F - NO ACTION

Alternative F can be considered a continuation of current management direction alternative. It continues the present course of action based on established goals and objectives from existing plans which have been modified to meet and respond to present and projected program levels and consumptive demands. This is the required "no action" alternative that provides a basis for comparison with other alternatives.

All three Wilderness Study Areas would be managed under existing management direction in accordance with the Colorado Wilderness Act of 1980, Public Law 96-560, so as to maintain wilderness character and potential.

Expected Future Condition

Developed recreation and downhill skiing capacities are maintained at nearly current levels with a slight increase due to trailhead construction. Many dispersed semi-primitive recreation opportunities have been foreclosed by development for other resources such as timber. The roads needed to develop timber result in increased road-oriented recreation. There is sufficient capacity to meet demand for the less primitive forms of dispersed recreation, but most likely not for semi-primitive non-motorized recreation. A minor amount of trail miles are added in specific project areas and a few trailheads are constructed to prevent resource damage. There is only a moderate emphasis on trail reconstruction, resulting in a net decrease in trail miles over time.

Cultural resources are identified and protected in accordance with laws and regulations. There are relatively few opportunities for archaeological research and preservation.

Heavily traveled routes and use areas have landscapes that are in a natural, visually acceptable condition. Management activities and their modifications are evident in secondary use areas.

Existing wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except those needed to disperse use and protect the resource. The three Wilderness Study Areas are managed to protect their wilderness values.

Wildlife habitat conditions are very similar to present day conditions. Fish habitat conditions are slightly improved. Vertical diversity is low.

Range condition is generally satisfactory in most areas with a stable to slightly upward trend. Livestock grazing for all types of livestock is at high levels.

Wood resource outputs are moderate to high, meeting industry needs.

Water yield is increased slightly due to commercial timber operations. Water quality is slightly improved.

The availability of access facilitates mineral related activities. Protection of surface resources and environmental quality is assured in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for mineral leasing with surface occupancy under the mineral leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE G

Alternative G emphasizes the production of market outputs such as timber, livestock grazing, and mineral resources, along with increased wilderness acreage and reduced administrative regulation and budget levels. This alternative has a limited increase in budget the first 10-year period and a reduced budget thereafter. This emphasis would be achieved by producing a mix of market and non-market outputs.

The West Needle, Piedra, and South San Juan Expansion Wilderness Study Areas are identified as suitable for inclusion in the National Wilderness Preservation System.

Expected Future Condition

Approximately 12 percent of the developed site capacity is eliminated by closing the least cost-efficient and lowest use camp and picnic grounds. Approximately half of the most cost-efficient sites are recommended for operation by concessionaires, and the remaining sites are operated at a reduced level by the Forest Service. Any demand in excess of available

capacity could be met only by the private sector. Opportunities are maintained to significantly increase downhill skiing capacity through expansion of existing ski areas and development of potential sites rated "good" or better. Road-oriented dispersed recreation capacities are increased by the construction of additional road miles, with the result that semi-primitive non-motorized opportunities are reduced. There is no additional construction of trails or trailheads. Total trail miles decrease over time.

Cultural resources are identified and protected in accordance with laws and regulations, although opportunities for research and preservation are low.

Areas adjacent to major travel routes and use areas are maintained in a visually acceptable condition. Areas viewed from travel corridors and use areas display evidence of some visual modification. Secondary travel routes and use areas have evidence of management activities in all viewing zones, some of which may not be harmonious with the characteristic landscape.

The west half of the Weminuche Wilderness, and the Piedra and West Needle Wildernesses (if designated by Congress) are managed under a direct user control system, such as required permits, to maximize dispersal of visitor use. All other wildernesses are managed with minimum restrictions on visitor numbers and activities.

Wildlife habitats show increased carrying capacity; however, many habitats are impacted by additional human use. Vertical diversity is slightly improved as a result of additional acres placed under uneven-aged timber management. Fish habitat improvement is low.

Range condition is generally satisfactory with stable to gradual improvement. Livestock grazing is maintained at a fairly high level except in timber sale and reforestation areas where grazing is reduced to protect timber resources.

Although wood resource outputs are moderate, the present needs of local industry are met.

Water yield is increased slightly due to commercial timber operation. Water quality is slightly improved.

Minerals exploration and development occurs within the constraints of available access. Protection of surface resources and environmental quality is assured, in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for mineral leasing with surface occupancy under the mineral leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

ALTERNATIVE H - PREFERRED ALTERNATIVE (PROPOSED FOREST PLAN)

Alternative H emphasizes the market outputs of timber, livestock grazing and developed recreation while slightly increasing water yield, dispersed recreation, wildlife habitat, visual quality, and mineral resources. Opportunities are provided for increasing downhill skier capacity and wilderness area. This alternative has a budget which is the minimum necessary to achieve these outputs yet protect the productive potential of the land and maintain environmental quality.

The West Needle and Piedra Wilderness Study Areas are identified as suitable for inclusion in the National Wilderness Preservation System; the South San Juan Wilderness Expansion Study Area is identified as unsuitable.

Expected Future Condition

Overall developed recreation site capacity is increased slightly to accommodate heavy use at existing sites and by the construction of trailheads. A few high-cost/low-use sites are eliminated and needed reconstruction of facilities is accomplished. There is some conversion of overnight facilities to day use. Approximately 10 percent of the developed recreation site capacity is considered for operation by concessionaires. Opportunities are maintained to increase downhill skiing capacity over current levels. Dispersed recreation capacity is generally maintained and is capable of meeting demand. Road-oriented opportunities increase slightly through construction of roads for resource development. While the acreage for semi-primitive recreation decreases, the quality of these opportunities is increased through the construction of some new trails and trailheads, and the overall capacity is more than adequate to meet demand. However, total trail mileage will decrease over time as low use/high cost trails are phased out.

Cultural resources are identified and protected in accordance with laws and regulations. There are a moderate number of opportunities for research and preservation.

Heavily used travel corridors and some high use areas are maintained in natural appearing conditions. Opportunities are provided to view some points of interest and unique landscapes. Scenery modifications resulting from management activities are evident in some high use areas.

Existing wildernesses are managed to provide high quality wilderness experiences with minimum restrictions on visitor numbers and activities except those needed to disperse use and protect the resource.

Wildlife habitats have increased carrying capacity with a high percentage of these habitats being effectively utilized. Fish habitat improvement is slight. Vertical diversity improves at a slow rate as a result of uneven-aged timber management.

Range condition is generally satisfactory in most areas and improves gradually over time. Livestock grazing increases at a moderate rate.

Wood resource outputs are available in fairly high amounts which are sufficient to meet the needs of existing or moderately expanded local dependent industry.

Water yield increases moderately due to commercial timber operations. Water quality is slightly improved.

Mineral exploration and development is carried out within the constraints of available access. Protection of surface resources and environmental quality is assured in accordance with laws and regulations. Most of the Forest outside of wildernesses and Wilderness Study Areas is available for minerals leasing with surface occupancy under the minerals leasing laws. Opportunities are very limited within wildernesses and Wilderness Study Areas.

COMPARISON OF ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

The National Environmental Policy Act (40 CFR 1502.14) requires a comparison of alternatives. These comparisons are to include a summary of environmental effects that are developed in Chapter IV, Environmental Consequences. Table II-3 summarizes the cost-efficiency analysis of each alternative considered in detail using a discount rate of four percent. The summary displays discounted costs, discounted benefits, and incremental economic parameters associated with each alternative. These parameters are "incremental" in that costs and benefits of minimum level management have been subtracted out prior to calculation of the parameter.

Table II-4 displays a maximum present net value trade-off analysis, using Benchmark #3 to represent that alternative having the maximum possible present net value. Alternatives are listed in order of increasing opportunity cost from Behcnmark #3.

Table II-5 displays acres allocated to each prescription by alternative. The amount of each prescription that is applied under an alternative determines how much of a given resource output will be produced. The outputs produced reflect the emphasis of the alternative.

Table II-6 displays by alternative selected outputs, impacts, and environmental consequences in the year 1995. Table II-7 summarizes average annual outputs for selected resources over the entire 50-year planning horizon. For a more detailed discussion of the effects of alternatives, see Chapter IV, Environmental Consequences.

These tables are followed by a comparison of planning questions resolution by alternative (Table II-8).

TABLE II-3

Cost-Efficiency Analysis of Alternatives Considered in Detail Based on a Discount Rate of Four Percent. (All figures except benefit-cost ratios are in millions of 1978 dollars)

	Benchmark #3	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
Discounted Benefits									
Total Benefits	1674.8	1596.1	1699.1	1624.5	1654.6	1675.8	1647.6	1682.2	1701.6
Minimum Level Benefits	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3
Incremental Benefits	442.5	363.8	466.8	392.2	422.3	443.5	415.3	449.9	469.3
Discounted Costs									
Total Costs	116.8	150.4	205.6	144.5	117.3	166.0	152.8	136.6	155.3
Minimum Level Costs	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Incremental Costs	108.5	142.1	197.3	136.2	109.0	157.7	144.5	128.3	147.0
Incremental Present Net Value	334.0	221.7	269.5	256.0	313.0	285.8	270.8	321.6	322.3
Incremental Benefit-Cost Ratio	4.08	2.56	2.37	2.88	3.87	2.81	2.87	3.51	3.19

TABLE II-4

Trade-off Analysis from Maximum Present Net Value (Benchmark #3) Based on Four Percent Discount Rate. Alternatives are Listed in Order of Increasing Opportunity Cost from Benchmark #3. (All figures are in millions of 1978 dollars.)

	Benchmark #2	Benchmark #3	Alternatives H (Preferred)	G	D	E (RPA)	F (No Action)	B	C	A
Incremental Present Net Value	28.4	334.0	322.3	321.6	313.0	285.8	270.8	269.5	256.0	221.7
Difference in Present Net Value from Benchmark #3 (Opportunity Cost)	--	--	11.7	12.4	21.0	48.2	63.2	64.5	78.0	112.3
Difference in Benefits from Benchmark #3	--	--	26.8	7.4	-20.2	1.0	-27.2	24.3	-50.3	-78.7
Difference in Costs from Benchmark #3	--	--	38.5	19.8	0.5	49.2	36.0	88.8	27.7	33.6

TABLE II-5

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
A_1	High level of livestock production; mechanical practices for range improvement.	--	57,691	52,291	73,917	--	12,386	73,917	26,852
A_2	High level of livestock production; no mechanical practices for range improvement.	--	28,837	8,406	95,280	17,892	15,690	93,200	19,924
B	High levels of livestock and timber production; increased water yield; improved wildlife habitat.	112,193	198,715	99,960	169,183	261,213	128,521	170,196	241,356
C	High level of timber production; only compatible management activities will occur.	--	188,908	73,901	71,782	--	--	64,935	--
D	High levels of timber production; improved wildlife habitat and recreation.	71,734	132,128	109,103	235,178	122,111	767,682	227,936	302,115
E	High quality wildlife habitat; moderate to high timber production on commercial forest land.	--	217,283	20,960	29,425	78,767	236	29,425	41,952
F_1	High quality wildlife habitat; high timber production on commercial forest land; livestock grazing is excluded from regenerating stands.	2,525	17,987	376	11,149	18,666	--	11,149	25,388
F_2	Same as F_1, except limited livestock grazing is permitted in regenerating stands.	65,031	37,855	60,206	108,943	32,024	70,335	108,943	125,749
G_1	Semi-primitive motorized recreation; some grazing; some commercial timber production.	155,409	44,968	132,208	41,348	131,432	--	41,348	43,579
G_2	Semi-primitive motorized recreation; some grazing; no commercial timber production.	90,913	9,523	128,280	13,325	88,963	54,254	13,170	32,876
H	High quality semi-primitive non-motorized recreation; no commercial timber production.	492,116	--	615,393	--	101,412	86,047	--	266,888
I	Winter sports sites.	2,567	14,664	15,824	14,792	8,199	2,567	14,547	9,609
J	Scenic qualities along travel routes.	182,297	538	50,887	34,840	56,470	46,125	34,831	57,619

TABLE II-5 (Continued)

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
8	Wilderness (with minimum restrictions on visitor numbers and activities.)								
8a	Very high levels of solitude; very high opportunities for challenge, risk, self-reliance and initiative.	-- --	277,964 (63,815)*	292,004 (63,815)*	277,964 (63,815)*	322,944 (63,815)*	277,964 (63,815)*	199,640 (52,455)*	322,944 (63,815)*
8b	High levels of solitude; high opportunities for challenge, risk and self-reliance.	-- --	33,600 (26,441)*	34,400 (26,441)*	33,600 (26,441)*	44,320 (26,441)*	33,600 (26,441)*	17,280 (26,441)*	44,320 (26,441)*
8c	Moderate levels of solitude; moderate opportunities for challenge, risk and self-reliance.	-- --	41,280 (184,367)*	42,240 (184,367)*	41,280 (184,367)*	42,240 (184,367)*	41,280 (184,367)*	14,560 (147,847)*	42,240 (184,367)*
8d	Low levels of solitude; low opportunities for challenge, risk and self-reliance.	--	7,840 (1,380)*	7,840 (1,380)*	7,840 (1,380)*	8,480 (1,380)*	7,840 (1,380)*	2,624 (1,380)*	8,480 (1,380)*
8	Wilderness (with controls on visitor numbers and activities.)								
8e	Very high levels of solitude; very high opportunities for challenge, risk, self-reliance and initiative.	345,664 (58,335)*	-- --	-- --	-- --	-- --	-- --	146,024 (11,360)*	-- --
8f	High levels of solitude; high opportunities for challenge, risk and self-reliance.	52,320 (30,371)*	-- --	-- --	-- --	-- --	-- --	35,040 --	-- --
8g	Moderate levels of solitude; moderate opportunities for challenge, risk and self-reliance.	44,320 (184,797)*	-- --	-- --	-- --	-- --	-- --	29,760 (36,520)*	-- --
8h	Low levels of solitude; low opportunities for challenge, risk and self-reliance.	8,480 (2,500)*	-- --	-- --	-- --	-- --	-- --	5,856 --	-- --
K_3	Maintenance of the qualities of an area which make it possible for inclusion in the National Wilderness Preservation System; to be used on all Wilderness Study Areas, regardless of the Plan's recommendation, until Congress acts (acres are shown within other management areas except in Alternative F.)	--	--	--	--	--	90,100	--	--

TABLE II-5 (Continued)

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
L_1	Chimney Rock Archaeological Area, restricted public use.	3,160	--	--	3,160	--	3,160	3,160	--
L_2	Chimney Rock Archaeological Area, increased public use.	--	3,160	3,160	--	3,160	--	--	3,160
M	Riparian areas.**	37,704	40,087	39,763	40,087	38,407	37,704	37,704	38,407
N	Wild and Scenic River corridors.	18,221	20,213	20,213	20,213	18,221	18,221	18,221	18,221
O	Research Natural Areas.	5,787	1,928	2,302	1,928	2,302	1,928	1,928	2,302
P_1	High water production on lands suitable for timber production.	--	194,208	--	70,774	62,489	--	51,678	--
P_2	High water production on lands unsuitable for timber production.	--	831	--	--	5,998	--	--	--
Q	Developed recreation sites (acres are contained within other management areas).	(534)	(562)	(550)	(428)	(550)	(550)	(428)	(562)
R	Low to moderate livestock production; low density dispersed recreation; no commercial timber production.	177,341	297,574	58,065	471,744	402,072	172,142	420,710	193,801
Total		1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782

* Acres in parentheses are within Lizard Head, South San Juan or Weminuche Wildernesses but are not on the San Juan National Forest.

** Riparian areas were not separated out for wilderness areas or when Wilderness Study Areas were determined suitable for wilderness in each alternative.

TABLE II-6

Alternative Comparison (Average Annual 1995 Unless Otherwise Noted)

Activity	Unit of Measure	1980 Production	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
RECREATION										
Developed Capacity	Thousand Visitor Days 1/	2261	2340	2388	2468	2095	2468	2335	2095	2393
Developed Use	Thousand Visitor Days	583 2/	1020	1070	1040	930	1040	1040	930	1070
Downhill Ski Capacity	Thousand Visitor Days	314	500	1121	1121	1121	1121	500	1121	1121
Downhill Ski Use	Thousand Visitor Days	138	260	550	550	550	550	260	550	550
Dispersed Use	Thousand Visitor Days	878	1680	1855	1800	1855	1855	1855	1855	1855
Off-Road Motorized Use	Visitor Days	63	160	120	160	160	140	120	150	120
Semi-Primitive Non-Motorized & Primitive Area	Thousand Acres	1074	1070	546	1057	633	955	645	694	837
Semi-Primitive Motorized Area	Thousand Acres	164	346	216	315	303	233	164	277	164
VISUAL QUALITY OBJECTIVES										
Preservation, Retention, Partial Retention	Thousand Acres	1385	1658	848	1477	1085	1340	1057	1118	1183
Modification, Max. Modification	Thousand Acres	483	210	1020	391	783	528	811	750	685
WILDERNESS										
Wilderness Use 3/	Thousand Visitor Days	249	406	439	439	439	439	439	439	439
Additional Wilderness	Thousand Acres	N/A	90.1	0	15.8	0	57.3	0	90.1	57.3
WILDLIFE AND FISH										
Improved Habitat	Thousand Acres	390	778	1000	710	719	981	863	745	1019
Big Game Winter Range Carrying Capacity	Thousand Deer	16.4	19.5	26.5	19.8	19.2	20.9	18.3	20.1	21.7
	Thousand Elk	12.8	13.8	16.0	13.9	13.7	14.2	13.4	13.9	14.1

TABLE II-6 (Continued)

Alternative Comparison (Average Annual 1995 Unless Otherwise Noted)

Activity	Unit of Measure	1980 Production	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
Fish Habitat Improvement	Miles (50 year average)	3	7	2	5	0	8	5	2	5
Big Game Hunting 4/	Thousand Visitor Days	92	151	173	139	173	170	173	173	173
Small Game Hunting 4/	Thousand Visitor Days	16	27	30	23	30	30	30	30	30
Fishing 4/	Thousand Visitor Days	137	222	255	209	255	251	255	255	255
Non-game Use 4/	Thousand Visitor Days	10	16	18	11	18	18	18	18	18
RANGE										
Livestock Grazing	Thousand Animal Unit Months 5/	170.2	149.1	188.6	182.8	173.6	185.6	187.1	193.1	190.8
TIMBER										
Not Available For Timber	Thousand Acres	290.2	231.6	168.5	169.5	168.5	209.5	231.6	231.6	209.5
Not Suitable For Timber	Thousand Acres	466.2	585.3	257.4	622.8	450.6	486.4	278.2	413.6	442.1
Suitable For Timber	Thousand Acres	632.1	302.1	693.2	326.7	499.9	423.1	609.2	473.8	467.4
Annual Sale Offerings	Million Board Feet (Green Volume)	33.8	26.0	72.4	34.0	32.8	34.0	38.8	40.0	42.0
Long-Term Sustained Yield	Million Board Feet	N/A	47.6	113.2	52.4	83.9	68.4	104.8	79.6	76.0
Acres Treated Intermediate	Thousand Acres	12.0	4.5	1.4	2.8	5.6	3.7	4.0	3.5	8.1
Clearcut	Thousand Acres	.3	.9	7.2	1.8	0.9	0.9	1.7	1.7	2.1
Shelterwood	Thousand Acres	0	1.3	1.4	1.5	0	0.7	.3	.9	1.0
Selection	Thousand Acres	0	1.2	0	1.5	0	2.3	.3	.8	.1
Reforestation 6/	Thousand Acres	3.4	.3	6.0	1.7	0	0.2	0.2	1.4	1.2
Timber Stand Improvement	Thousand Acres	3.3	6.7	10.9	9.4	9.2	10.0	11.9	9.2	8.9
WATER										
Water Yield	Million Acre Feet	2.500	2.503	2.563	2.507	2.505	2.506	2.508	2.508	2.511
Water Meeting Quality Goals	Million Acre Feet	1.85	1.85	1.81	1.85	1.85	1.85	1.85	1.85	1.85

TABLE II-6 (Continued)

Alternative Comparison (Average Annual 1995 Unless Otherwise Noted)

Activity	Unit of Measure	1980 Production	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
MINERALS LEASING										
Total San Juan N. F. No Lease	Thousand Acres	N/A	324.2	263.1	293.3	263.1	302.2	470.8	305.2	302.1
Lease without surface occupancy	Thousand Acres	N/A	273.6	178.1	261.4	187.1	210.2	139.3	210.0	222.7
Lease	Thousand Acres	N/A	1270.0	1426.7	1313.1	1417.7	1355.4	1257.7	1352.6	1342.9
Wilderness 3/ No Lease	Thousand Acres	N/A	434.7	430.5	432.5	430.7	431.2	636.7	433.8	432.5
Lease without surface occupancy	Thousand Acres	N/A	127.9	132.0	130.0	131.9	131.3	0	128.8	130.0
Lease	Thousand Acres	N/A	74.1	74.1	74.1	74.1	74.1	0	74.1	74.1
Wilderness Study Areas No Lease	Thousand Acres	N/A	39.5	0.1	10.9	0.1	30.6	90.1	39.5	31.0
Lease without surface occupancy	Thousand Acres	N/A	32.1	6.4	14.4	6.4	21.3	0	32.1	24.0
Lease	Thousand Acres	N/A	18.5	83.7	64.8	83.7	38.2	0	18.5	35.1
SOILS										
Potential Erosion	Tons/acre/year (50 year average)	.239	.172	.334	.154	.291	.251	.270	.269	.227
FACILITIES - ROADS										
Local Construction/ Reconstruction	Miles/year (50 year average)	37.5	27.9	57.1	30.8	35.5	34.7	47.4	38.8	37.6
Arterial/Collector Construction/ Reconstruction	Miles/year (50 year average)	5.0	9.6	14.0	9.6	11.8	10.3	15.1	12.9	10.9
Roads Maintained	Miles	2218	2232	2533	1981	2307	2205	2469	2312	2302
TRAILS										
Trails Maintained	Miles	1153	1250	750	1000	850	950	800	900	900

TABLE II-6 (Continued)

Alternative Comparison (Average Annual 1995 Unless Otherwise Noted)

Activity	Unit of Measure	1980 Production	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
FIRE										
Prescribed Fire	Thousand Acres	9.3	11.1	18.4	13.5	11.1	17.7	15.2	12.3	15.2
ENERGY										
Consumption	Trillion British Thermal Units	.81	1.09	1.76	1.43	1.38	1.43	1.33	1.41	1.41
SOCIAL AND ECONOMIC										
Increased Income 7/	Million Dollars	N/A	16.4	46.7	35.1	38.1	35.0	18.2	41.4	41.7
Increased Employment 7/	Number of Persons Employed	N/A	1140	3180	2490	2230	2710	1250	2890	2910
Increased Population 7/	Number of Persons	N/A	2500	6690	5450	4890	5940	2740	6320	6380
Payments to County Governments 8/	Thousand Dollars	187	435	1005	556	537	541	532	626	651
Budget 8/	Thousand Dollars (1981-1990 Average)	6489	6999	10042	7043	5235	9481	7268	6996	7005

1/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

2/ For comparison purposes, a hypothetical 109 thousand visitor days have been added to the 1980 outputs to represent use at the McPhee recreation sites. These sites are planned and will be available for public use in 1985.

3/ Includes entire Weminuche, Lizard Head and South San Juan Wildernesses (San Juan, Rio Grande, and Uncompahgre National Forests).

4/ Wildlife and fishing use figures are also included in dispersed recreation; they are not additive.

5/ Animal Unit Month = the amount of forage consumed by one mature cow or its equivalent in a one-month period.

6/ Reforestation figures include site preparation for natural regeneration.

7/ Increases, in the first decade, directly or indirectly attributed to San Juan National Forest outputs and activities.

8/ Expressed in terms of 1978 dollars.

TABLE II-7

Average Annual Outputs for Selected Resources Over the 50-Year Planning Horizon

Activity	Unit of Measure	1980 Production	Alternatives A	B	C	D	E (RPA)	F (No Action)	G	H (Preferred)
Timber	Million Board Feet	34	28	72	35	33	35	47	41	47
Range	Thousand Animal Unit Months	170.2	149.9	197.2	182.8	170.4	184.4	186.0	191.3	190.4
Developed Recreation	Thousand Visitor Days	583*	1174	1230	1193	1060	1193	1193	1060	1230
Dispersed Recreation	Thousand Visitor Days	878	1811	2076	1915	2076	2076	2076	2076	2076
Winter Sports	Thousand Visitor Days	138	301	782	782	782	710	301	782	710
Wilderness Recreation	Thousand Visitor Days	134	242	229	247	229	261	229	272	261
Wildlife Habitat Improvement	Thousand Acre Equivalents	130	114	160	105	108	181	152	116	179
Water Yield	Thousand Acre-Feet	2500	2509	2560	2515	2507	2521	2513	2512	2515

* For comparison purposes, a hypothetical 109 thousand visitor days have been added to the 1980 outputs to represent use at the McPhee recreation sites. These sites are planned and will be available for public use by 1985.

TABLE II-8

Comparison of Planning Questions

Planning Questions		Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST BE MANAGED TO PROVIDE A BROAD SPECTRUM OF DISPERSED RECREATION OPPORTUNITIES? Recreation (Dispersed) Outputs Estimated		A	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 57 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 19 percent of the area with the remainder of the Forest (24 percent) offering road oriented types of dispersed recreation in a more modified environment. New trailheads would be constructed to accommodate the increase in primitive and semi-primitive use.
Dispersed-Capacity	Thousand Visitor Days	B	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 29 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 12 percent of the area with the remainder of the Forest (59 percent) offering road oriented types of dispersed recreation in a more modified environment. No trailheads would be constructed.
Off-Road Motorized Use	Thousand Visitor Days		
Semi-Primitive Non-Motorized and Primitive Area	Thousand Acres	C	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 56 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 17 percent of the area with the remainder of the Forest (27 percent) offering road oriented types of dispersed recreation in a more modified environment. New trailheads would be constructed to accommodate the increase in primitive and semi-primitive use.
Semi-Primitive Motorized Area	Thousand Acres		
		D	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 34 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 16 percent of the area with the remainder of the Forest (50 percent) offering road oriented types of dispersed recreation in a more modified environment. No trailheads would be constructed.
		E (RPA)	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 51 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 12 percent of the area with the remainder of the Forest (37 percent) offering road oriented types of dispersed recreation in a more modified environment. New trailheads would be constructed to accommodate the increase in primitive and semi-primitive use.
		F (No Action)	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 35 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 9 percent of the area with the remainder of the Forest (56 percent) offering road oriented types of dispersed recreation in a more modified environment. A few trailheads would be constructed.
		G	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 37 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 15 percent of the area with the remainder of the Forest (48 percent) offering road oriented types of dispersed recreation in a more modified environment. No trailheads would be constructed.
		H (Preferred)	Opportunities for primitive and semi-primitive non-motorized recreation would exist on 44 percent of the Forest. Semi-primitive motorized recreation opportunities would exist on 9 percent of the area with the remainder of the Forest (47 percent) offering road oriented types of dispersed recreation in a more modified environment. New trailheads would be constructed to accommodate the increase in primitive and semi-primitive use.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions		Alternatives	Comparison
WHAT IS THE APPROPRIATE ROLE OF THE SAN JUAN NATIONAL FOREST IN PROVIDING CAMPGROUNDS, INTERPRETIVE SITES, PICNIC AREAS, AND REST STOPS?		A	Three existing developed sites (six percent of the existing capacity) would be closed. The remaining sites would continue to be operated and maintained by the San Juan National Forest.
		B	All existing developed sites would be retained. Eight existing sites would be reconstructed, and two would be expanded through new construction. All sites would be operated and maintained by the San Juan National Forest.
Recreation (Developed) Outputs Estimated			
Developed-Capacity	Thousand Visitor Days	C	Four sites would be rehabilitated or reconstructed, and all existing developed sites would be operated and maintained by the San Juan National Forest.
Developed-Use	Thousand Visitor Days	D	Twelve existing developed sites (17 percent of the existing capacity) would be closed. Four sites would be rehabilitated or reconstructed. Seventeen of the most cost-efficient sites (39 percent of the existing capacity) would be considered for operation by concessionaires. The remaining sites would be operated and maintained at a reduced level by the San Juan National Forest.
		E (RPA)	All existing developed sites would be operated and maintained by the San Juan National Forest.
		F (No Action)	All existing developed sites would be operated and maintained by the San Juan National Forest.
		G	Twelve existing developed sites (17 percent of the existing capacity) would be closed. Four sites would be rehabilitated or reconstructed. Seventeen of the most cost-efficient sites (39 percent of the existing capacity) would be considered for operation by concessionaires. The remaining sites would be operated and maintained at a reduced level by the San Juan National Forest.
		H (Preferred)	Five existing developed sites would be closed, six would be rehabilitated or reconstructed, and two would be expanded through new construction. This would result in a net reduction of six percent from existing capacity. Six sites (11 percent of the existing capacity) would be considered for operation by concessionaires. The remaining sites would be operated and maintained by the San Juan National Forest.
WHAT RESOURCES AND USES SHOULD BE ALLOCATED TO DOWNHILL SKIING ON THE SAN JUAN NATIONAL FOREST?		A	Downhill skiing would be restricted to present sites (Purgatory and Stoner). Purgatory and Stoner would be expanded under presently approved plans.
Recreation (Skiing) Outputs Estimated		B	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. All inventoried sites rated good or better (East Fork, Windy Pass, Dunton, Echo Basin, and Grayrock-Cascade) would have the opportunity for development.
Downhill Ski-Capacity	Thousand Visitor Days		
Downhill Ski-Use	Thousand Visitor Days	C	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. All inventoried sites rated good or better (East Fork, Windy Pass, Dunton, Echo Basin, and Grayrock-Cascade) would have the opportunity for development.
		D	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. All inventoried sites rated good or better (East Fork, Windy Pass, Dunton, Echo Basin, and Grayrock-Cascade) would have the opportunity for development.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
WHAT RESOURCES AND USES SHOULD BE ALLOCATED TO DOWNHILL SKIING ON THE SAN JUAN NATIONAL FOREST?	E (RPA)	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. Three inventoried sites rated good or better (East Fork, Windy Pass, and Grayrock-Cascade) would have the opportunity for development.
	F (No Action)	Downhill skiing would be restricted to present sites (Purgatory and Stoner). Both sites would be expanded under presently approved plans.
	G	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. All inventoried sites rated good or better (East Fork, Windy Pass, Dunton, Echo Basin, and Grayrock-Cascade) would have the opportunity for development.
	H (Preferred)	Existing winter sports areas (Purgatory and Stoner) would continue to operate and the expansion of both sites under presently approved plans would take place. Three inventoried sites rated good or better (East Fork, Windy Pass, and Grayrock-Cascade) would have the opportunity for development.
HOW MUCH DESIGNATED WILDERNESS SHOULD THE SAN JUAN NATIONAL FOREST HAVE, AND HOW SHOULD IT BE MANAGED? 1/ Wilderness Outputs Estimated Wilderness Mgmt. — Thousand Acres Wilderness Use — Thousand Visitor Days	A	All the Wilderness Study Areas (South San Juan Expansion -- 32,800 acres, Piedra -- 41,500 acres, and West Needle -- 15,800 acres) would be recommended suitable for wilderness designation. All wildernesses would be managed in accordance with the Wilderness Act of 1964 with controls on visitor numbers and activities to retain maximum integrity of wilderness environments.
	B	No Wilderness Study Areas would be recommended suitable for wilderness designation. Management of existing wildernesses would be in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
	C	The West Needle Wilderness Study Area (15,800 acres) would be recommended suitable for wilderness. Management of all wildernesses would be in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
	D	No Wilderness Study Areas would be recommended suitable for wilderness. Management of existing wildernesses would be in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
	E (RPA)	The Piedra (41,500 acres) and West Needle (15,800 acres) Wilderness Study Areas would be recommended suitable for wilderness designation. Management of all wildernesses would be in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
	F (No Action)	All the Wilderness Study Areas (South San Juan Expansion -- 32,800 acres, Piedra -- 41,500 acres, and West Needle -- 15,800 acres) would be managed to maintain their present character for possible future wilderness designation. All existing wildernesses would be managed in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
	G	All the Wilderness Study Areas (South San Juan Expansion -- 32,800 acres, Piedra -- 41,500 acres, and West Needle -- 15,800 acres) would be recommended suitable for wilderness. All existing wildernesses would be managed in accordance with the Wilderness Act of 1964. Controls on visitor numbers and activities to retain maximum integrity of wilderness environments would be instituted on the west portion of the Weminuche Wilderness and the Piedra and West Needle Study Areas if the WSA's are designated as wilderness by Congress. The remainder of the wildernesses would be managed with minimum restrictions on visitor use.

1/ When a recommendation as to the suitability or unsuitability for wilderness is made for the West Needle Wilderness Study Area, it also includes the same recommendation for the capable portion of the adjacent West Needle Contiguous Wilderness Study Area administered by the Bureau of Land Management.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW MUCH DESIGNATED WILDERNESS SHOULD THE SAN JUAN NATIONAL FOREST HAVE, AND HOW SHOULD IT BE MANAGED?	H (Preferred)	The Piedra (41,500 acres) and West Needle (15,800 acres) Wilderness Study Areas would be recommended suitable for wilderness. Management of all wildernesses would be in accordance with the Wilderness Act of 1964 with minimum restrictions on visitor use.
WHAT KIND OF TRANSPORTATION SYSTEM IS NECESSARY TO SERVE FUTURE RESOURCE MANAGEMENT AND PUBLIC NEEDS?	A	The number of road miles would remain essentially the same. Eighty-five percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. High emphasis would be placed on trail reconstruction. The number of miles of trail would increase by eight percent.
Facilities Outputs Estimated		
Roads-Constructed/ Reconstructed Miles -Maintained Miles Trails Maintained Miles	B	The number of road miles would increase by approximately 14 percent. Fifty-two percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Moderate emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 35 percent.
	C	The number of road miles would be reduced by approximately 11 percent. Eighty-five percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Moderate to high emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 13 percent.
	D	The number of road miles would increase by four percent. Sixty-eight percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Low emphasis would be placed on trail reconstruction. The miles of trail would decrease by 26 percent.
	E (RPA)	The number of road miles would remain essentially the same. Seventy-six percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Moderate emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 18 percent.
	F (No Action)	The number of road miles would increase by approximately 11 percent. Fifty-eight percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Moderate emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 31 percent.
	G	The number of road miles would increase by approximately four percent. Sixty-eight percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. High emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 22 percent.
	H (Preferred)	The number of road miles would increase by approximately four percent. Seventy-three percent of the area outside of wilderness presently unroaded or with low road density would remain in that condition. Moderate emphasis would be placed on trail reconstruction; however, the miles of trail would decrease by 22 percent.
HOW SHOULD THE SAN JUAN NATIONAL FOREST MANAGE ITS TREE RESOURCES? (See Timber Outputs Estimated on the following page.)	A	Average annual harvest would be 26 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 37 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 38 percent of the available and capable forest land. Thirty percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions		Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST MANAGE ITS TREE RESOURCES?		B	The average annual harvest would be 72 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 75 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 86 percent of the available and capable Forest land. Forty-six percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.
Timber Outputs Estimated			
Not Available For Timber	Thousand Acres	C	The average annual harvest would be 34 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 39 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 41 percent of the available and capable forest land. Thirty-three percent of the area with planned sales would be specifically designed to benefit range or wildlife resources.
Not Suited For Timber	Thousand Acres		
Suited For Timber	Thousand Acres		
Annual Sale Offerings	Million Board Feet (Green Volume)	D	The average annual harvest would be 21 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 43 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 62 percent of the available and capable forest land. Forty-one percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.
Long-Term Sustained Yield	Million Board Feet		
Acres Treated			
Intermediate	Thousand Acres	E (RPA)	The average annual harvest would be 32 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 42 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 53 percent of the available and capable forest land. Fifty-one percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.
Clearcut	Thousand Acres		
Shelterwood	Thousand Acres		
Reforestation	Thousand Acres	F (No Action)	The average annual harvest would be 35 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 75 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 76 percent of the available and capable forest land. Twenty-four percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.
Timber Stand Improvement	Thousand Acres		
		G	The average annual harvest would be 40 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 47 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 59 percent of the available and capable forest land. Forty-three percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.
		H (Preferred)	The average annual harvest would be 40 million board feet the first 10 years of the Plan. Harvest volume by the year 2030 would be 64 percent of the constrained maximum yield potential for that year. The total land area suitable for timber production is 58 percent of the available and capable forest land. Fifty-two percent of the areas with planned sales would be specifically designed to benefit range or wildlife resources.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions		Alternatives	Comparison
WHAT IS THE ROLE OF THE SAN JUAN NATIONAL FOREST IN PROVIDING WILDLIFE HABITAT? Wildlife and Fish Outputs Estimated		A	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 49 percent for deer and 20 percent for elk by by the year 2030. Improved wildlife habitat diversity would exist on 34 percent of the Forest. All of the suitable stream miles would be improved for fish habitat by the year 2020.
Improved Habitat	Thousand Acres	B	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 123 percent for deer and 49 percent for elk by the year 2030. Improved wildlife habitat diversity would exist on 48 percent of the Forest. Forty-two percent of the suitable stream miles would be improved for fish habitat by the year 2030.
Big Game Winter Range Carrying Capacity	Thousand Deer and Thousand Elk		
Fish Habitat Improvement	Miles	C	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 38 percent for deer and 18 percent for elk by the year 2030. Wildlife habitat diversity would be improved on 28 percent of the Forest. All of the suitable stream miles would be improved for fish habitat by the year 2020.
		D	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 34 percent for deer and 13 percent for elk by the year 2030. Wildlife habitat diversity would be improved on 41 percent of the Forest. No stream miles would be improved for fish habitat.
		E (RPA)	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 57 percent for deer and 23 percent for elk by the year 2030. Wildlife habitat diversity would be improved on 44 percent of the Forest. All of the suitable stream miles would be improved for fish habitat by the year 2010.
		F (No Action)	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 21 percent for deer and nine percent for elk by the year 2030. Wildlife habitat diversity would be improved on 56 percent of the Forest. All of the suitable stream miles would be improved for fish habitat by the year 2020.
		G	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 43 percent for deer and 16 percent for elk by the year 2030. Wildlife habitat diversity would be improved on 39 percent of the Forest. Forty-two percent of the suitable stream miles would be improved for fish habitat by the year 2030.
		H (Preferred)	Habitat for endangered and threatened species would be maintained and improved. Big game winter range carrying capacity would increase by 66 percent for deer and 24 percent for elk by the year 2030. Wildlife habitat diversity would be improved on 48 percent of the Forest. All of the suitable stream miles would be improved for fish habitat by the year 2020.
WHAT IS THE ROLE OF THE SAN JUAN NATIONAL FOREST IN PROVIDING FOR GRAZING OF DOMESTIC LIVESTOCK? (See Outputs Estimated on the following page.)		A	Authorized livestock grazing would decrease by 19 percent in the first decade and gradually increase from that level to a net reduction from present levels of eight percent by the year 2030. Intensive livestock management would be in effect on approximately 27 percent of the Forest.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions		Alternatives	Comparison
WHAT IS THE ROLE OF THE SAN JUAN NATIONAL FOREST IN PROVIDING FOR GRAZING OF DOMESTIC LIVESTOCK?		B	Authorized livestock grazing would increase by one percent in the first decade and continue the trend at a more rapid rate to a net increase from present levels of 28 percent by the year 2030. Intensive livestock management would be in effect on approximately 59 percent of the Forest.
Range Outputs Estimated			
Livestock Grazing	Thousand Animal Unit Months	C	Authorized livestock grazing would decrease by four percent in the first decade and gradually increase from that level to a net increase from present levels of 13 percent by the year 2030. Intensive livestock management would be in effect on approximately 52 percent of the Forest.
		D	Authorized livestock grazing would decrease 10 percent in the first decade and gradually increase from that level to a net increase from present levels of four percent by the year 2030. Intensive livestock management would be in effect on approximately 44 percent of the Forest.
		E (RPA)	Authorized livestock grazing would decrease by two percent in the first decade and increase from that level to a net increase from present levels of 15 percent by the year 2030. Intensive livestock management would be in effect on approximately 53 percent of the Forest.
		F (No Action)	Authorized livestock grazing would decrease by one percent in the first decade and increase from that level to a net increase from present levels of 15 percent by the year 2030. Intensive livestock management would be in effect on approximately 56 percent of the Forest.
		G	Authorized livestock grazing would increase by two percent in the first decade and continue the trend to a net increase from present levels of 16 percent by the year 2030. Intensive livestock management would be in effect on approximately 58 percent of the Forest.
		H (Preferred)	Authorized livestock grazing would remain near current levels in the first decade and increase from that level to a net increase from present levels of 18 percent by the year 2030. Intensive management would be in effect on approximately 59 percent of the Forest.
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO THE INCREASING DEMAND FOR HIGH-QUALITY WATER?		A	Water yield increase by the year 2030 would reach approximately 23 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
Water Outputs Estimated			
Water Yield	Million Acre-Feet	B	Water yield increase by the year 2030 would reach approximately 96 percent of water yield increase potential. Water quality would be reduced due to increased sediment yields. Wetland and riparian ecosystems would be maintained or enhanced.
Water Meeting Quality Goals	Million Acre-Feet	C	Water yield increase by the year 2030 would reach approximately 39 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
		D	Water yield increase by the year 2030 would reach approximately 19 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
		E (RPA)	Water yield increase by the year 2030 would reach approximately 43 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO THE INCREASING DEMAND FOR HIGH-QUALITY WATER?	F (No Action)	Water yield increase by the year 2030 would reach approximately 28 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
	G	Water yield increase by the year 2030 would reach approximately 25 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
	H (Preferred)	Water yield increase by the year 2030 would reach approximately 28 percent of water yield increase potential. Water meeting quality goals would increase slightly. Wetland and riparian ecosystems would be maintained or enhanced.
WHAT IS THE ROLE OF THE SAN JUAN NATIONAL FOREST IN REGARD TO THE IDENTIFICATION, PROTECTION, AND USE OF CULTURAL RESOURCES? Cultural Effects Estimated Land Altering Activities — Acres	A	Cultural resources would be identified and protected in accordance with laws and regulations. A Research Natural Area of approximately 3485 acres would be established for research and educational purposes. Limited public use of the Chimney Rock Archaeological Area would be allowed. Suitable cultural resource properties would be developed for public enjoyment on approximately 50 percent of the Forest.
	B	Cultural resources would be identified and protected in accordance with laws and regulations. The Chimney Rock Archaeological Area would be managed for increased public use. Suitable cultural resource properties would be developed for public enjoyment on approximately four percent of the Forest.
	C	Cultural resources would be identified and protected in accordance with laws and regulations. The Chimney Rock Archaeological Area would be managed for increased public use. Suitable cultural resource properties would be developed for public enjoyment on approximately 51 percent of the Forest.
	D	Cultural resources would be identified and protected in accordance with laws and regulations. Limited public use of the Chimney Rock Archaeological Area would be allowed. Suitable cultural resource properties would be developed for public enjoyment on approximately six percent of the Forest.
	E (RPA)	Cultural resources would be identified and protected in accordance with laws and regulations. The Chimney Rock Archaeological Area would be managed for increased public use. Suitable cultural resource properties would be developed for public enjoyment on approximately 21 percent of the Forest.
	F (No Action)	Cultural resources would be identified and protected in accordance with laws and regulations. Limited public use of the Chimney Rock Archaeological Area would be allowed. Suitable cultural resource properties would be developed for public enjoyment on approximately 11 percent of the Forest.
	G	Cultural resources would be identified and protected in accordance with laws and regulations. Limited public use of the Chimney Rock Archaeological Area would be allowed. Suitable cultural resource properties would be developed for public enjoyment on approximately six percent of the Forest.
	H (Preferred)	Cultural resources would be identified and protected in accordance with laws and regulations. The Chimney Rock Archaeological Area would be managed for increased public use. Suitable cultural resource properties would be developed for public enjoyment on approximately 22 percent of the Forest.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO MINERAL RESOURCE DEVELOPMENT?	A	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be high. Lack of available road access would make mineral exploration difficult and relatively expensive.
Mineral Outputs Estimated		
Operating Plans Number		Eighty-three percent of the net Forest acreage would be available for minerals leasing (68 percent would be leased with surface occupancy and 15 percent without surface occupancy). The remaining 17 percent would be recommended to BLM for denial of minerals leasing.
Oil and Gas Leasing		
No lease areas Acres		Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 20 percent would be available for minerals leasing without surface occupancy. The remaining 68 percent would be recommended to BLM for denial of minerals leasing.
Lease without surface occupancy area Acres		Twenty-one percent of all three of the Wilderness Study Areas would be available for minerals leasing with surface occupancy. An additional 36 percent would be available for minerals leasing without surface occupancy. The remaining 43 percent would be recommended to BLM for denial of minerals leasing.
Lease with surface occupancy area Acres		
	B	Protection of the surface resource and the environment would would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be relatively low. The availability of road access would facilitate mineral exploration with relatively low investments.
		Eighty-six percent of the net Forest acreage would be available for minerals leasing; of which 76 percent would be leased with surface occupancy and 10 percent without surface occupancy. The remaining 14 percent would be recommended to BLM for denial of minerals leasing.
		Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 21 percent would be available for minerals leasing without surface occupancy. The remaining 67 percent would be recommended to BLM for denial of minerals leasing.
		Under this alternative none of the Wilderness Study Areas would be recommended for wilderness and the lands would be administered as unclassified lands for minerals leasing.
	C	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be high. Lack of available road access would make mineral exploration difficult and relatively expensive.
		Eighty-four percent of the net Forest acreage would be available for minerals leasing; of which 70 percent would be leased with surface occupancy and 14 percent without surface occupancy. The remaining 16 percent would be recommended to BLM for denial of minerals leasing.
		Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 20 percent would be available for minerals leasing without surface occupancy. The remaining 68 percent would be recommended to BLM for denial of minerals leasing.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO MINERAL RESOURCE DEVELOPMENT?		Under this alternative only the West Needle Wilderness Study Area would be recommended for wilderness and none of it would be recommended for minerals leasing with surface occupancy. Thirty-four percent would be available for minerals leasing without surface occupancy. The remaining 66 percent would be recommended to BLM for denial of minerals leasing.
	D	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in to rehabilitation for soil and water protection would be moderate. The availability of road access would facilitate mineral exploration with moderate investments. Eighty-six percent of the net Forest acreage would be available for minerals leasing; of which 76 percent would be leased with surface occupancy and 10 percent without surface occupancy. The remaining 14 percent would be recommended to BLM for denial of minerals leasing. Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 21 percent would be available for minerals leasing without surface occupancy. The remaining 67 percent would be recommended to BLM for denial of minerals leasing. Under this alternative none of the Wilderness Study Areas would be recommended for wilderness and the lands would be administered as unclassified lands for minerals leasing.
	E (RPA)	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be high. Lack of available road access would make mineral exploration difficult and relatively expensive. Eighty-four percent of the net Forest acreage would be available for minerals leasing; of which 73 percent would be leased with surface occupancy and 11 percent without surface occupancy. The remaining 16 percent would be recommended to BLM for denial of minerals leasing. Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 21 percent would be available for minerals leasing without surface occupancy. The remaining 67 percent would be recommended to BLM for denial of minerals leasing. Under this alternative 12 percent of the Piedra and West Needle Wilderness Study Areas would be available for minerals leasing with surface occupancy. An additional 35 percent would be available for minerals leasing without surface occupancy. The remaining 53 percent would be recommended to BLM for denial of minerals leasing.
	F (No Action)	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be relatively low. The availability of road access would facilitate mineral exploration with relatively low investments. Seventy-five percent of the net Forest acreage would be available for minerals leasing; of which 67 percent would be leased with surface occupancy and eight percent without surface occupancy. The remaining 25 percent would be recommended to BLM for denial of minerals leasing.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO MINERAL RESOURCE DEVELOPMENT?		Under this alternative all mineral lease applications for all wilderness or Wilderness Study Area lands would be recommended to BLM for denial of minerals leasing.
	G	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be moderate. Lack of available road access would make mineral exploration difficult and relatively expensive. Eighty-four percent of the net Forest acreage would be available for minerals leasing; of which 72 percent would be leased with surface occupancy and 12 percent without surface occupancy. The remaining 16 percent would be recommended to BLM for denial of minerals leasing. Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 20 percent would be available for minerals leasing without surface occupancy. The remaining 68 percent would be recommended to BLM for denial of minerals leasing. Twenty-one percent of all three of the Wilderness Study Areas would be available for minerals leasing with surface occupancy. An additional 36 percent would be available for minerals leasing without surface occupancy. The remaining 43 percent would be recommended to BLM for denial of minerals leasing.
	H (Preferred)	Protection of the surface resource and the environment would be ensured. The amount of area requiring mitigation measures in addition to rehabilitation for soil and water protection would be moderate. Lack of available access would make mineral exploration difficult and relatively expensive. Eighty-four percent of the net Forest acreage would be available for minerals leasing; of which 72 percent would be leased with surface occupancy and 12 percent without surface occupancy. The remaining 16 percent would be recommended to BLM for denial of minerals leasing. Twelve percent of the total wildernesses would be available for minerals leasing with surface occupancy. An additional 20 percent would be available for minerals leasing without surface occupancy. The remaining 68 percent would be recommended to BLM for denial of minerals leasing. Under this alternative 12 percent of the Piedra and West Needle Wilderness Study Areas would be available for minerals leasing with surface occupancy. An additional 35 percent would be available for minerals leasing without surface occupancy. The remaining 53 percent would be recommended to BLM for denial of minerals leasing.
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO THE INCREASING DEMAND FOR SPECIAL USES AND LAND ADJUSTMENTS? (See Land Outputs Estimated on the following page.)	A	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 80 acres of land purchases and acquisitions; 250 acres of land exchanges, 2 rights-of-way acquired; and 28 miles of land line located.

TABLE II-8 (Continued)

Comparison of Planning Questions

Planning Questions	Alternatives	Comparison
HOW SHOULD THE SAN JUAN NATIONAL FOREST RESPOND TO THE INCREASING DEMAND FOR SPECIAL USES AND LAND ADJUSTMENTS? Land Outputs Estimated Land Purchase and Acquisition Acres Land Exchange Offering Acres Right-of-Way Acquisition Cases Occupancy Trespass Cases Land Line Location Miles	B	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 160 acres of land purchases and acquisitions; 1,000 acres of land exchanges; 4 rights-of-way acquired; and 62 miles of land line located.
	C	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 100 acres of land purchases and acquisitions; 500 acres of land exchanges; 3 rights-of-way acquired; and 31 miles of land line located.
	D	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 80 acres of land purchases and acquisitions; 250 acres of land exchanges; 2 rights-of-way acquired and 15 miles of land line located.
	E (RPA)	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 1,817 acres of land purchases and acquisitions; 750 acres of land exchanges; 4 rights-of-way acquired; and 85 miles of land line located.
	F (No Action)	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 80 acres of land purchases and acquisitions; 250 acres of land exchanges; 3 rights-of-way acquired; and 30 miles of land line located.
	G	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 80 acres of land purchases and acquisitions; 250 acres of land exchanges; 2 rights-of-way acquired; and 28 miles of land line located.
	H (Preferred)	Opportunities for occupancy and permitted use under special use permits would only be allowed if there is a demonstrated public need and the uses are compatible with or contribute to Forest objectives. Land adjustment annual goals for the first 10 years of the Plan would be as follows: 100 acres of land purchases and acquisitions; 500 acres of land exchanges; 3 rights-of-way acquired; and 45 miles of land line located.



III. affected environment

CHAPTER III

AFFECTED ENVIRONMENT

OVERVIEW

This chapter describes the environment of the area to be affected by the implementation of the proposed action or an alternative. The Physical and Biological Setting Section of this chapter describes the general physical and biological conditions existing in the San Juan National Forest. The geology, topography, climate, and plant and animal life are discussed. The Social and Economic Setting describes the human, social, and economic environment of the San Juan National Forest. The Resource Elements Section provides a detailed review of current use, management, and demand trends for the San Juan National Forest's resources. Projections of supply and demand developed in Planning Action 4, "The Analysis of the Management Situation," for resource outputs are included in Appendix A of the Forest Plan. The Support Elements Section discusses activities needed to maintain and develop the resources.

PHYSICAL AND BIOLOGICAL SETTING

The San Juan National Forest covers 1,867,782 acres in southwestern Colorado.

The boundary of the Forest encompasses the northeastern portions of the San Juan and Dolores River basins. The boundary generally follows the crest of the Continental Divide and the Wilson Mountains on the east and north. The south and west boundary extends stairstep fashion from Chromo, Colorado, in the southeast to a point 40 miles northwest of Dolores, Colorado.

The San Juan River system drains most of the San Juan National Forest, except for that part of the Forest in the Dolores River drainage. The Mancos, Animas, Los Pinos and Piedra Rivers are major tributaries of the San Juan River. Both the Dolores and the San Juan Rivers eventually flow into the upper Colorado River.

The San Juan National Forest is located where the Southern Rocky Mountain physiographic province joins the Colorado Plateau province. The Forest has diverse topography consisting of mesas, deep canyons, foothills and rugged mountains. The San Juan Mountains dominate the eastern end of the Forest. The La Plata, Rico, and Wilson Mountains are in the central and west portions of the Forest. Elevations range from just above 6,000 feet to peaks over 14,000 feet.

General topography and geology of the San Juan National Forest resulted from the domal uplift of a 10,000 square mile area which was subsequently eroded by a combination of water and extensive alpine glaciation. Volcanic activity, faulting, and sagging have also been part of the geological process.

The San Juan National Forest includes four major vegetation zones:

LOWER MONTANE

The lower montane forests occupy an elevation range of 6,000 to 8,500 feet. This zone occurs on the lower to mid-foothills, plateaus, and canyon sides of the Forest. Soils vary considerably in depth and texture but have formed predominantly in materials weathered from sandstones and shales with some wind influence on the western portion of the Forest.

This zone has a growing season of 90 to 120 days, with warm summers and cold winters. Humidity is low; precipitation averages 15 to 25 inches annually.

Predominant vegetation is pinyon pine and juniper with associated grasses and shrubs on the lower elevations and canyon side slopes. Ponderosa pine, Gambel oak, and Douglas-fir occur in the upper portions of the zone.

UPPER MONTANE

The upper montane forest is found from 8,000 to 9,500 feet. It occupies the upper foothills, canyon sideslopes and lower mountain slopes of the Forest. The soils vary considerably in depth and texture as in the lower montane. The soils have formed in materials weathered mainly from sandstones and shales. At the higher elevations of the zone igneous materials are found.

The length of the growing season will typically range between 75 and 90 days. The zone is slightly cooler and more humid than the lower elevations. Precipitation averages from 23 to 30 inches annually.

The major forest species are: Douglas-fir, white fir, corkbark (subalpine) fir, Engelmann spruce, blue spruce, and aspen. Ponderosa pine and Gambel oak will occur at the lower elevations of this zone.

SUBALPINE FOREST

The subalpine forest occurs at elevations of 8,500 to 11,500 feet. This zone occupies the upper mountain slopes and mountain canyon sideslopes of the San Juan National Forest.

Geology of the zone includes some sandstones and shales, but is typified by granites and volcanics. Soils in this zone generally have more rock and stone on the surface and within the soil profile. They are generally younger and less developed. Wet meadows and bogs occur frequently.

The climate is characterized by cool summers and cold winters. The length of the growing season is 45 to 75 days. Average annual precipitation is between 30 and 40 inches.

The principle vegetation types are sedge-grass meadows with Engelmann spruce, corkbark (subalpine) fir and aspen occurring in the forested areas.

ALPINE TUNDRA

The alpine tundra region is found at elevations above 11,000 feet.

Most of the zone has undergone extensive glaciation and is characterized by rugged alpine landforms. The geology within this zone is predominantly igneous, with occasional quartzites, granites, sandstones, limestones, and shales.

This zone contains large areas of exposed rock. The soils contain large amounts of stone and are well drained on the steeper areas. Depressions and bowls contain poorly drained soils and often standing water.

This zone has short cool summers and long cold winters. Snow cover typically lasts from September to July. Strong winds, variable moisture and a growing season of 45 days or less create a harsh environment.

Vegetation on moist sites includes tufted hairgrass, sedges and willows, while on dry sites, fescues, sedges, bluegrasses and numerous forbs are found. Timberline forms the lower boundary of this zone. Scattered krummholz of spruce or fir are found within this zone.

Wildlife range throughout all four vegetation zones. Representative wildlife species include mule deer, elk, bighorn sheep, mountain lion, coyote, bear, beaver, and marten. Game fish species include cutthroat (natives), rainbow, brook and brown trout, northern pike and kokanee salmon.

SOCIAL AND ECONOMIC SETTING

AREA OF INFLUENCE

The area of primary social and economic influence of the San Juan National Forest is basically Archuleta, Dolores, La Plata, Montezuma and San Juan Counties in southwestern Colorado. The Forest covers 1.5 million acres in this five-county area, and activities and outputs are estimated to be directly or indirectly responsible for approximately 12 percent of the total employment in the area of influence. (While portions of the San Juan National Forest are found in Conejos, Hinsdale, Mineral, Rio Grande and San Miguel Counties, residents there relate more strongly to communities and National Forests north and east of the Continental Divide.)

POPULATION

The area of influence is separated from the front range population centers of Colorado by the Continental Divide and the San Juan Mountains; the area's total population is about 50,000. Populations declined, in some cases dramatically, in all five counties between 1960 and 1970 (See Table III-1). This trend reversed itself spectacularly after 1970, and projected growth is expected to more than double the five-county area's population over the next 30 years.

Almost half of the area's population lives in Durango, Cortez, Pagosa Springs and the seven other incorporated towns in the area of influence. Subdivision growth around Durango, Cortez and Pagosa Springs is rapid and rural "bedroom" communities are developing.

TABLE III-1

Population Trends, 1960 to 2010

County	1960	1970	1980	1990	2000	2010
Archuleta	2,629	2,733	3,631	5,400	6,300	7,000
Dolores	2,196	1,641	1,657	1,800	1,800	1,800
La Plata	19,225	19,199	27,107	40,300	53,100	65,800
Montezuma	14,024	12,952	16,348	18,400	22,800	27,500
San Juan	849	831	830	1,000	1,200	1,400
Total	38,923	37,356	49,573	66,900	85,200	103,500

(Source: Colorado Department of Labor and Employment)

These population trends show evidence of the National population shifts toward the "sun belt" and rural areas. People have been, and will probably continue to be, attracted to this area by its climate, scenery, variety of outdoor recreation activities and natural resources. The population is ethnically mixed, but predominantly Caucasian. The 1980 estimates are 5.7 percent Native American, 0.1 percent Black, 0.2 percent Asian, and 94 percent Oaucasian, including 11.5 percent Hispanic. (Source: Colorado Population Reports; 1980 Census Report)

EMPLOYMENT AND INCOME

The average per capita income for the five-county area in 1973 was about $3,630; by 1978 it had risen to $5,450. After correcting for inflation, this represents about a ten percent increase in per capita real income. Total personal income earned by all residents also increased markedly from 1973 to 1978 -- except in Dolores County. Table III-2 portrays income in the five-county area.

TABLE III-2

Income in the Five-County Area

County	1973 Per Capita	1978 Per Capita	1973 Total Personal (1000 $)	1978 Total Personal (1000 $)	Percent Change in Personal 1973-78
Archuleta	$3,059	$5,222	$ 8,620	$ 19,447	+126
Dolores	4,730	5,064	7,791	8,361	+7
La Plata	3,560	5,950	76,426	151,261	+98
Montezuma	3,695	5,881	51,179	90,465	+77
San Juan	3,112	5,140	2,614	4,122	+58
	$3,630 (Avg.)	$5,450 (Avg.)	$146,630 (Total)	$273,656 (Total)	+73 (Avg.)

(Source: Colorado Department of Labor and Employment)

Unemployment in 1980 was low in all counties except Archuleta, which experienced an unemployment rate of nearly 12 percent. The total labor force in the five-county area in April 1980 was estimated to be 23,950, of which 22,606 were employed, for an overall unemployment rate of 5.6 percent -- slightly above the Colorado average for the time of 3.6 percent. About 12 percent of this employment, or approximately 2,750 jobs, relates to activities on the San Juan National Forest. Based on an employment to population ratio of 1 to 2.2 for the area, these jobs support about 6,000 residents of the five-county area. Table III-3 displays the employment influence of the Forest by selected sectors.

TABLE III-3

Employment Influence of the Forest - 1980

	Employment Due to Forest Activities (Persons Employed)
Tourism	865
Agriculture	100
Logging/Sawmills/Wood Products	125
Other	1660
Total	2750

SOCIAL RESOURCE UNITS

Social Resource Units (SRU's) serve as a framework for assessing social, cultural, and economic interactions with the physical resources. Social Resource Units reflect common issues. As these issues are clarified, goals can be set by the public, government, and businesses to create human, economic, and environmental benefits. SRU's are defined by natural boundaries such as mountain valleys and river basins and by the way people live such as settlement patterns and agricultural activity.

The Forest lies within the Region's Social Resource Unit K. This unit is shown on Figure III-1; it lies in a physically isolated area separated from the rest of Colorado by the Continental Divide to the east and the San Juan Mountain Range on the north. A major portion of the southern part of the SRU is Southern Ute and Ute Mountain Ute Indian Reservation. The desert of Utah isolates the SRU from other settlements to the west.

HUMAN RESOURCE UNITS

The Forest has delineated smaller units of analysis within the boundaries of Social Resource Unit K. These are called Human Resource Units (HRU's) and are used to design management actions that respond to changing conditions at the Ranger District or Forest level. A Human Resource Unit is an area characterized by particular patterns of lifestyles, economic conditions, institutional arrangements, and topography. HRU's vary in size but are typically larger than individual towns and communities, and they may cross political jurisdictions.

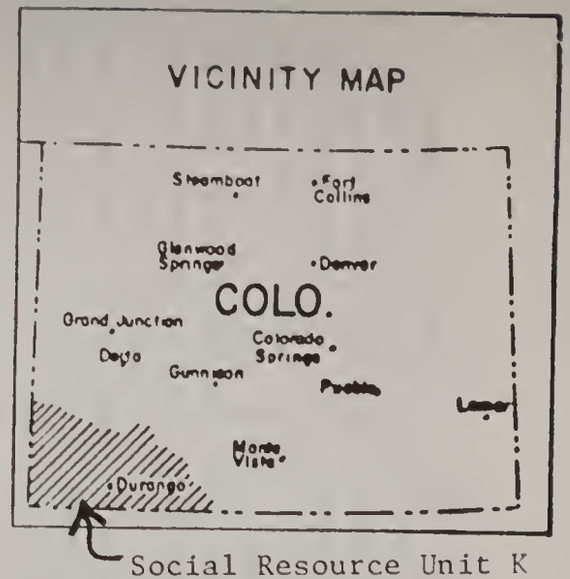
There are three HRU's identified on the Forest. They are shown on Figure III-1. The Pagosa, Animas and Montelores HRU's were designated to help design management actions at the National Forest and Ranger District levels that would be responsive to local issues, conditions and needs.

The following discussion briefly describes each one by identifying the general history of the area; lifestyles; attitudes, beliefs, and values; social organization; and significant population characteristics.

Montelores Human Resource Unit

The Montelores HRU lies primarily in Montezuma and Dolores Counties, although a portion of it extends eastward into La Plata County, and northward into San Miguel County. The west border of the unit is the Utah state line and the New Mexico State line is the south border. The north boundary runs from a point a few miles north of the Dolores County line southeastward to a point a few miles east of Lizard Head Pass. The east boundary is the west boundary of the Animas HRU. This HRU is perceived by the residents as the "Montelores Area."

HUMAN RESOURCE UNITS
San Juan Nat'l Forest



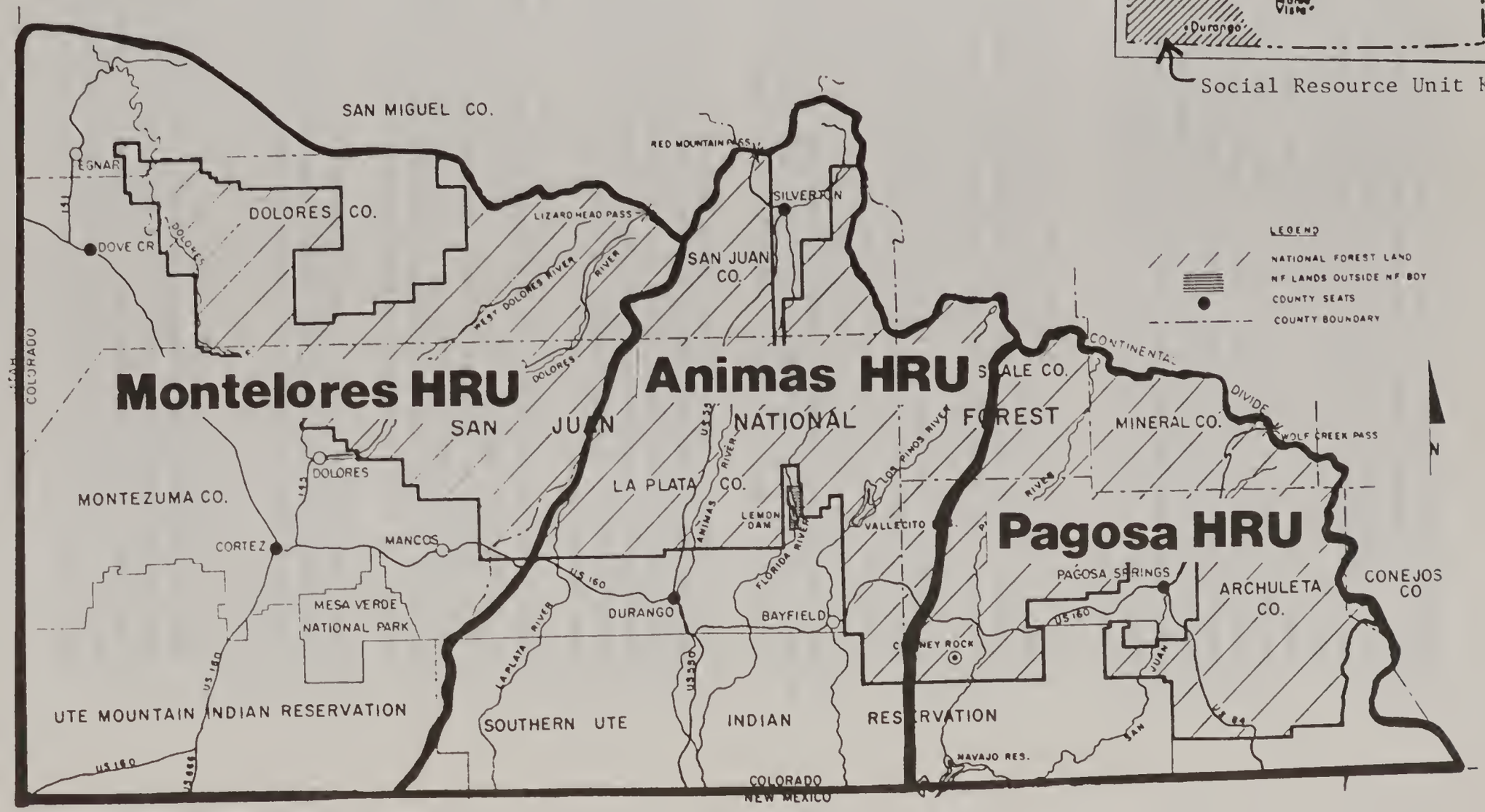


FIGURE III-1

Settlement - Modern settlement began in the 1870's. Ranching, sawmilling, and mining were primary reasons for settlement. Montezuma County was incorporated in 1889 while the towns of Mancos, Dolores, and Cortez, were incorporated in 1894, 1900 and 1902 respectively. Since that time the history has been somewhat boom and bust. The last of the large early mines closed in 1933 and at that same time a small migration of midwest dust bowl farmers arrived. From 1956-1964 a boom occurred based on oil and uranium. The area is again growing. Now the more diverse base includes agriculture, timber, mining, oil and gas, and tourism. Mesa Verde National Park is the main tourist attraction. The Dolores Water Storage Project will increase water-based recreation opportunities when the McPhee Reservoir and related recreation facilities are completed.

The Ute Mountain Ute Indian Reservation, with a population of approximately 700, is headquartered at Towaoc, about 15 miles southwest of Cortez. The Navajo Indian Reservation surrounds the famed "Four Corners" although there is no Navajo reservation land in Colorado.

Lifestyle - The entire area is strongly oriented toward a rural lifestyle. Cortez is the only town with over 1,000 people, but it is a community oriented toward tourism, agriculture, mineral and energy development. Cortez is the trade center of the HRU and Montezuma County is the second most populous county in southwestern Colorado. Durango and Farmington, New Mexico are utilized for larger facilities and more specialized medical, legal and other services.

Light industry, government, tourism and retail trade dominate Cortez, and the place of employment is generally in town. For the rest of the HRU, employment is more agriculture dominated and is also more seasonal. Unemployment increases during the winter. Big game hunting attracts a large number of out-of-area hunters and is economically important for many businesses.

Summer recreation focuses on fishing, camping, hiking, and other types of recreation opportunities on National Forest System lands. No major ski areas exist within the HRU but smaller areas (Hesperus and Stoner) are used by local residents, and the area is within commuting distance from Telluride and Purgatory. Winter recreation is on the increase, especially cross-country skiing and snowmobiling.

Attitudes, Beliefs and Values - The predominant attitudes toward natural resources in the Montelores HRU seem to be that resources should be developed and utilized for growth, progress, and better standards of living.

Social Organization - All areas in the HRU are covered by protective services such as law enforcement, fire districts, and search and rescue. The County Sheriff's patrol services are provided for Forest Service campgrounds. Medical facilities, including a full service hospital, are found in Cortez, but cases requiring specialized care are usually referred to facilities in Durango or Farmington, New Mexico.

Population and Land Use - Population in the area has increased more than 20 percent during the past 10 years with most of the increase occurring in Montezuma County. The population is more than 80 percent Caucasian from European cultures with people from Native American and Hispanic cultures making up most of the remainder.

All of the Dolores and nearly half of the Montezuma County populations live in what are considered rural areas. Ranching and agriculture are the most prevalent land uses with minor trends toward subdivision of these lands. Sharp increases in mineral and energy development along with the resulting irrigation prospects and recreation developments connected with the Dolores Project will have a major influence in changing land uses.

Animas Human Resource Unit

The Animas Human Resource Unit (HRU) is bounded on the west by a line running essentially from Red Mountain Pass southwest to the New Mexico border. This line crosses U.S. Highway 160 just west of Hesperus. The north boundary of the HRU is the Continental Divide. The east border runs south from the Divide a few miles east of the Los Pinos River down to the New Mexico line.

The entire HRU is strongly oriented toward Durango as a primary trade and service center, and as a recreation visitor entry point into the unit. The bulk of the unit is in La Plata and San Juan Counties.

Settlement - The first modern settlement in the area was at Baker's Bridge in 1861, followed in 1865 by Baker's Park, now called Silverton. Durango was settled in 1881, based on the narrow gauge railroad which still transports tourists and freight between Silverton and Durango. Durango and Silverton were both settled to provide services to miners; but Bayfield, to the east, was settled in the 1880's as an agricultural community. Residential areas that have developed in the more recent past, such as Vallecito, have been primarily oriented toward recreation.

The Southern Ute Indian Reservation, with a population of approximately 900, is located immediately south of the San Juan National Forest's east half in the Animas HRU. The Tribe has expressed interest in cooperating with the Forest Service on issues of mutual concern.

Lifestyle - The lifestyle of the Durango area is generally centered around a seasonal tourist economy. The majority of the work force is employed in retail trade and in tourist-related businesses, skilled trades such as construction, agriculture, and logging, and in white-collar professions such as public administration and education. The primary area of employment is in the Durango vicinity. Oil and gas exploration and drilling and hard-rock mining are growing areas of employment, along with construction and tourism. Seasonal employment is primarily recreation-tourist oriented. Employment directly generated by San Juan National Forest land use is mostly recreation, logging and ranching.

Winter recreation in the form of downhill skiing, cross-country skiing and snowmobiling are major activities in the HRU. Purgatory Ski Area, a destination area, had 271,500 skier visits in 1980. Three smaller areas near Durango, Bayfield, and Hesperus provide opportunities in heavy snow years. Purgatory employs about 250 people during peak use periods. Cross-country skiing and snowmobiling are less organized, but rapidly gaining in popularity.

Hunting and fishing are also major recreation activities of HRU residents as well as nonresidents using the San Juan National Forest. Much of the out-of-State hunting and fishing in the HRU comes from residents of Texas and New Mexico.

Campers, picnickers, sightseers, and other recreation visitors also provide significant use of the National Forest within the HRU and provide significant impact on the economy.

Attitudes, Beliefs and Values - This HRU has a mix of residents with a wide range of attitudes, beliefs, and political philosophy. At one end of the spectrum are those who believe strongly in individual rights and oppose interference from government at all levels. At the other end of the spectrum are those who believe that government can and should be used to solve many social and community problems. The community within the HRU is easily polarized on issues, including those related to natural resource management. The proposed Animas-La Plata water development project is one example of a major issue that has generated factional controversies in the HRU.

Social Organization - The Animas HRU has two major medical facilities. Fire protection, law enforcement, and search and rescue efforts are all provided. There are also the standard social services found in most American communities. Durango is a regional trading center for major purchases such as automobiles and heavy appliances.

In addition, Fort Lewis College, located in Durango, has an enrollment of 3,300 and offers Bachelor degrees in 24 different fields.

Population and Land Use - This area has developed into a cosmopolitan community with roots in the Native American, Hispanic and European cultures. It is a widely diversified community with a wide cross-section of people who are formally educated and skilled and some who have had little formal education and are unskilled. This diversification along with an increasing influx of people moving here for the mountain area environment have resulted in historical agricultural lands becoming more in demand for subdivisions, dwelling lots, and mountain cabin retreats.

Changing land uses are becoming a significant problem of National Forest management, as ranchlands bordering the Forest are subdivided for residential housing. Not only is much critical winter range for big game

being destroyed, but in some cases access is being closed off by subdivision residents who do not want the public using "their" roads to go to the National Forest. Projected population growth is likely to accelerate this trend. As these lands go out of agricultural production, the economy of the area is also likely to become more dependent on tourism.

Pagosa Human Resource Unit

The Pagosa Human Resource Unit (HRU) centers on the town of Pagosa Springs, the only incorporated community within the HRU boundaries. The Continental Divide is the dominant feature on the east and north boundaries of the unit. The New Mexico State line forms the south boundary. The west boundary is formed by the hydrological divide between the Los Pinos and Piedra River.

Settlement - Gold prospecting was the primary motivation for the initial modern settlement of the Pagosa area, but ranching gained importance in the late 1800's. Large numbers of cattle and horses were brought to the San Juan Basin in about 1878, followed by sheep in about 1882. Throughout these early days range wars were frequent.

Lumbering became important in the early 1900's, when the railroad came to Pagosa Springs and the first sawmills began operation. The more accessible timber tracts were claimed under various land laws, cut over, and converted to agricultural uses.

Lifestyles - Until the present, the local economy has been almost exclusively dependent on the lumbering and ranching industries. However, tourism, retirement living, and the associated urban support systems are rapidly replacing the resource-oriented economy. The economic future of the area appears to be recreation-oriented, with the development of major resorts and additional subdivisions projected.

Many ranches and farms have already been sold to subdividers and holding companies. Construction employment has increased, but local lumber production has declined with the closing of local mills. Employment in transportation, utilities and communication is showing a modest increase with added population. Mining employment is expected to remain steady. Wholesale and retail trade are showing a large increase -- two new shopping centers have been built in the past ten years and the total number of retail trade outlets in the HRU has increased significantly.

Average family incomes in the Pagosa HRU are low compared to those in the rest of Colorado. Unemployment in April 1980 was 11.8 percent -- more than three times the State-wide average. The closing of the area's major sawmill has put many people out of work, but increases in tourism and construction are beginning to take up some of the slack. Education and government are also significant employers in the area.

Hunting and fishing are major recreation activities in the area; much of it taking place on the San Juan National Forest. Elk hunters come to the Pagosa area from all over the nation. Texas provides the greatest number of out-of-State hunters, followed by New Mexico, Arizona and

Oklahoma. The Pagosa Springs setting also attracts many summer visitors; hiking, camping, swimming, and golf and tennis at resorts are major activities. Wolf Creek Ski Area, on the east side of Wolf Creek Pass, not only serves the HRU, but draws skiers from many eastern states.

Other popular winter recreation activities include snowmobiling, cross-country skiing, and organized adult and high school sports.

Attitudes, Beliefs and Values - Public awareness of the recreational environment of the National Forest is increasing with immigration to the area. There is a changing public attitude toward protecting and preserving rather than developing and using Forest resources such as timber, forage and minerals. In the future, direct conflicts can be anticipated between those who hold "preservation" attitudes and those who believe resources should be developed to meet local income and employment needs.

Social Organization - Law enforcement, fire protection, and search and rescue are all provided in the Pagosa HRU, but the nearest hospitals are located in Durango and Del Norte, Colorado and Chama, New Mexico. Emergency medical treatment, and doctors for everyday care are available in Pagosa Springs. Two county ambulances staffed by volunteer emergency medical technicians are available to take injured persons to these hospitals. While a Hospital Taxing District was voted in, it is still in its infancy. Pagosa Springs has an array of shopping facilities, but prices tend to be higher, and inventories are limited enough that many people drive to Durango to shop.

Population and Land Use - The Pagosa HRU is unique in its population mix. At one time, Archuleta County was one of three counties in Colorado with a majority of residents of Hispanic ethnic background. Recent population influxes have changed this mix, but the Hispanic influence in the HRU is still strong. A significant emerging group of residents are the retirees who have chosen the Pagosa area. Many of these self-styled refugees from the large metropolitan areas are purchasing homes in subdivisions and then using the National Forest for a large amount of their leisure activities. The Southern Ute Indian Reservation is south of the Forest in the Pagosa HRU; the Tribal Council is particularly interested in development of recreation facilities at the Chimney Rock Archaeological Area. They have suggested a cooperative effort involving development of visitor facilities at their nearby Capote Lake site.

Changing land uses from agriculture to subdivisions and resorts such as the proposed East Fork Ski Area have had and will continue to have a major impact on the area. Along with the shift from an agricultural-timber-mining economy to one based strongly on recreation and retirement living comes an increase in demands for services local governments seem hard-pressed to meet. As an example, Archuleta County is discovering that the increased tax base from subdivisions is not keeping up the the cost of maintaining subdivision roads. However, some of the "new people," while espousing the virtues of "environmental living" and "getting away from it all," also demand that local governments supply

the same levels of service available in larger metropolitan areas. This change in land uses and the local economy also is reflected in fewer timber sales and a potential decrease in grazing on the Forest which will, in turn, generate smaller revenues and lower payments to counties from National Forest System receipts, further compounding the county's financial problems.

RESOURCE ELEMENTS

As an ecological system and an asset to the public, the San Juan National Forest may be described in terms of its resource elements and support activities. The Forest's capacity to provide outputs, goods, and services is directly related to its ability to manage these resources and support activities. The following is an overview of resources and supporting activities involved in the management of the San Juan National Forest. They are the same elements used in developing the National Renewable Resources Program and Assessment as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA).

The following discussion is intended to portray the management situation as it relates to the various resource elements. Although resource elements are discussed individually, it must be remembered that management of the Forest occurs on an integrated resource basis. Management activities affect a variety of resources, and decisions are made only after considering the entire set of ramifications involved. Similarly, single management activities are actually designed to serve a variety of resource objectives. Timber harvests, for example, are designed not only to remove timber in the most cost-efficient manner, but also to increase water yield in appropriate areas. Water developments are designed to serve the needs of certain wildlife species as well as domestic livestock. Roads are located to efficiently transport logs from the timber sale area to the mill, but these same roads are also designed to provide access for hunting, firewood gathering, and recreation.

Other inter-relationships are more separated chronologically. For example; timber harvesting, when it improves the balance of successional stages of vegetation, can improve wildlife habitat diversity. Improved diversity leads to a gradual increase in populations of certain animal species, which in turn increases recreation opportunities for viewing, photographing, and hunting these animals. This series of events may take several years to come to fruition, yet it may be entirely the result of a single management activity.

Therefore, resources that are discussed individually below are really part of a very complex system with numerous interactions. They are described individually only to emphasize important aspects of the current situation in some type of organized framework. These elements must be conceptually combined in order to understand the overall current situation on the Forest.

RECREATION

Recreation is one of the major uses of the San Juan National Forest. An estimated 1.18 million recreation visits occurred in 1980 [approximately 1.62 million recreation visitor days (RVD's)]. Use is distributed as follows:

Dispersed Recreation

Current Use and Management - Specific dispersed recreational opportunities available on the San Juan National Forest include:

> Spring, Summer, Fall - Hiking, backpacking, picnicking, camping, gathering forest products, trail biking, driving for pleasure, fishing, hunting, boating, rafting, mountain climbing, swimming, horseback riding, and general leisure and sight-seeing.
>
> Winter - Cross-country skiing, snowmobiling, snowshoeing, ice fishing, snow play, sledding and tobogganing.

The San Juan National Forest has approximately 1,867,000 acres that are available for dispersed recreation activities. This area can be broken down by use of the Recreation Opportunity Spectrum (ROS) Classes. ROS Classes provide a framework for defining the types of outdoor recreation opportunities the public desires, and identifying what portions of the spectrum a National Forest might be able to provide. Currently, the San Juan National Forest has approximately 11,000 acres in the Rural ROS Class; 618,000 acres in the Roaded Natural Appearing ROS Class; 164,000 acres in the Semi-primitive Motorized ROS Class; 764,000 acres in the Semi-primitive Non-motorized ROS Class; and 310,000 acres in the Primitive ROS Class.

Dispersed recreation use outside of wilderness is estimated at 878,000 RVD's per year. It accounts for the largest amount of recreation use and is projected to be the fastest growing segment of recreation on the San Juan National Forest.

Under the San Juan National Forest travel management program, certain sensitive and erosive areas and trails are closed to motorized off-road vehicles (ORV) or use is restricted. Sixty-eight percent of the non-wilderness area of the Forest is open to ORV's, 32 percent is seasonally closed, and less than one percent is permanently closed.

Demand Trends - Factors such as population growth, more leisure time and energy costs will affect the increases in most types of dispersed recreation. Other assumptions related to dispersed recreation are:

-Total dispersed recreation use will continue to increase faster than developed recreation.

-As travel expenses increase, the amount of dispersed recreation use on the Forest by local residents will increase. This may result in an increase in most types of dispersed recreation on the San Juan National Forest.

-Travel expense increases may result in a shift to the guided tour concept for non-residents. People may arrive in aircraft or chartered bus and avail themselves of one or more opportunities such as a guide service, sightseeing bus tour, or guided 4-wheel drive tours.

-Based on current assumptions and trends dispersed recreation use is expected to more than double to 1,855,000 RVD's by the year 2000 and reach 2,540,000 RVD's by the year 2030. The off-road motorized use portion would be 120,000 RVD's by the year 2000, and 165,000 RVD's by the year 2030. The estimated total dispersed recreation use capacity with full development and access is approximately 24,000,000 RVD's. The off-road motorized use portion would amount to approximately 1,875,000 RVD's.

Trails

Current Use and Management - The San Juan National Forest trail system consists of approximately 305 miles within three wildernesses, and 850 miles of trails outside of wilderness. Trail use outside the wilderness is predominantly recreation oriented; 200 miles are used primarily as stock trails, fire access, or for other miscellaneous uses.

In 1979, two trails on the Forest were established as National Recreation Trails (NRT) under the National Trails System Act. The Calico NRT on the Dolores District is 6.5 miles long; the Highline Loop NRT on the Mancos District is 20 miles long.

About 120 miles of the proposed Continental Divide National Scenic Trail corridor is on the San Juan National Forest. This trail crosses numerous times between the Rio Grande and San Juan National Forests.

Trails are maintained on a periodic basis; the frequency is determined by trail use and need for maintenance. Some trails are being obliterated by project activities and replaced with roads. Some little-used trails are being allowed to revert to natural vegetation growth.

Demand Trends - Projected demand for trails is expected to increase along with the demand for dispersed recreation opportunity. The demand for trails closer to the population centers is expected to exceed that for more remote trails.

Developed Recreation

Current Use and Management - The 60 "public sector" sites on the San Juan National Forest have a total use of about 391,000 Recreation Visitor Days (RVD's) per year. These sites have a combined total capacity of 5,730 Persons-at-One-Time (PAOT) which could provide for a use of 2,261,000 RVD's. The sites include 37 campgrounds, 7 picnic areas, 4 boating sites, 2 group campgrounds, 6 developed trailheads, and 5 observation or interpretive sites, including the Chimney Rock Archaeological Area. The season of use generally runs from May 15 through November 15, 185 days. Fees are charged on campground and group picnic sites meeting Land and Water Conservation Fund Act criteria. Presently, 33 of the 60 sites are designated as fee areas. In 1980, returns to the Treasury from these fees were $40,700.

Nearly all "public sector" sites are currently maintained to complement the natural environment, and provide adequate visitor facilities, such as toilets, tables, fire rings, and roads.

A major impact on developed recreation use will be the completion of the Dolores Project and the construction of the McPhee Dam and Reservoir. Upon completion of the project, the lands and developed recreation areas around the reservoir will be transferred to the Forest Service. Initial development of recreation facilities is planned for a capacity of 754 PAOT by 1985. Dispersed recreation capacity is estimated at 900 PAOT. Initial use by 1985 is expected to be 239,000 RVD's. The largest suppliers of developed recreation, outside the San Juan National Forest, are private campgrounds and Mesa Verde National Park with an estimated total theoretical capacity of 4,580,000 RVD's. Non-National Forest developed recreation use within the planning area is expected to increase from 30 to 40 percent of present theoretical capacity to 75 to 85 percent by the year 2030.

Other forms of developed recreation include use at private recreation residences on National Forest land, and use occurring at ski areas not counted as downhill skiing, such as snow play, spectator use, and summer slide use at the Purgatory Ski Area. These other forms of developed recreation (private sector) currently account for an additional 83,000 RVD's annually.

The current economic viability of private sector development is limited by a short summer season of 4½ months, competition with State and Federal recreation facilities, and high land costs associated with high demand for mountain subdivisions and winter sports accommodations. This has resulted in private sector emphasis on winter sports areas and a few key tourist destination areas.

Demand Trends - Assessing estimated consumption and demand for developed recreation is a subjective process. Factors which influence these trends include population growth in the area, travel costs, recreation development by the private sector, and additional development in the public sector. One peculiarity of this resource is that providing a developed recreation site actually creates a demand for developed recreation at that site which had not previously existed. Developed recreation assumptions include:

-Demand for developed recreation will increase as local population increases.

-Dispersed recreation demand is expected to increase faster than developed recreation demand.

-As travel expenses increase, visitors will lengthen the duration of their visit to the Forest.

-As travel expenses increase, use of developed sites by local residents will increase.

Ski Areas

Current Use and Management - There are two operating ski areas on the San Juan National Forest, Stoner and Purgatory. Current annual use at these areas is 138,000 RVD's. Stoner is a small, weekend-type ski area presently operated by a nonprofit club. It has two T-Bar lifts which are partially located on the Forest (27 acres) and a small rope tow on private land, with a total capacity of 380 skiers at one time. During the 1979-1980 season, Stoner had 4,544 skier visits. Annual use at Stoner has not increased significantly for several years.

Purgatory Ski Area is much larger than Stoner. A Master Plan for the area, approved in 1979, lists the following statistics for the area:

	Current	Planned
Skier Capacity (Skiers per day)	3,200	5,300
Parking Capacity (Skiers per day)	3,200	5,300
Restaurant Capacity (Skiers per day)	3,413	5,723
Acres Under Permit	2,500	2,500
Vertical Rise (Feet)	1,600	2,000

During the 1979-1980 season there were 271,500 skier visits. Skier use averaged 51 percent of capacity on weekdays and 76 percent of capacity on weekends. The capacity of 3,200 skiers per day was exceeded 13 times during the season.

Purgatory is the only destination ski resort in the San Juan National Forest. Approximately 60 to 70 percent of the skiers are from out-of-State, mostly from New Mexico, Texas, and Arizona. The market for out-of-State skiers is favorable as Purgatory is the only major ski area in Colorado that can be driven to from the southwestern states without crossing a major mountain pass. Commercial jet aircraft capability at the La Plata County Airport further enhances this aspect of Purgatory Ski Area.

Purgatory currently has five double chair lifts serving approximately 500 acres of runs. Proposed expansion would add two more chairlifts and increase the area served to about 700 acres. In 1979, Purgatory installed a summer slide which involves riding a sled-like vehicle down a fiberglass chute. This attraction has increased summer use of the area.

Demand Trends - Demand for downhill skiing generally far exceeds supply. Consistent demand in spite of energy shortages and higher lift ticket prices suggests that substantial increases in capacity would be paralleled by increases in use. Thus, assessment of the amount of new capacity needed is difficult. Most of the impetus behind development proposals on the Forest comes from local communities seeking a broader economic base. Use by 1995 will more than double if current trends continue.

All of the 15 inventoried potential ski area sites on the Forest have been proposed for development at some time in the past. Most of these were first recognized in the early 1960's when ski area development in Colorado was at a peak. There is known current interest by the private sector in at least three of these sites: East Fork, Windy Pass, and Grayrock-Cascade. The remaining 12 are still on inventory as a result of interest expressed about 20 years ago. There is also current interest within the private sector in the expansion of the Stoner Ski Area.

Cultural Resources

The San Juan National Forest is rich in cultural history. The first human use of the area probably occurred during the Paleo-Indian period in North America's prehistory, sometime between 10,000 B.C. and 5,000 B.C.

Evidence exists to support the theory that the Forest was being used extensively by small bands of hunting and gathering peoples of the Archaic period from around 5,000 B.C. to 100 A.D. However, little else can be said about the early prehistory of the San Juan National Forest, as these early uses have not been extensively studied by archaeologists.

More complete evidence is available from the Anasazi period (around 100 A.D. to 1300 A.D.) through American Indian, Spanish exploration, and the early mining and ranching periods.

Many Anasazi ruins are found throughout the Forest. Along with the major historic population centers such as Mesa Verde and Chimney Rock there are numerous sites that represent the various periods of Anasazi history. Other evidence of the early development of the resources in the San Juan Mountains can be found, such as old mines, pack trails, toll roads, and sites of the narrow gauge railroads that traversed the area.

Current Use and Management - Active cultural resource management with a full time archeologist on the Forest Supervisor's staff is a relatively new program, dating from the mid-1970's. Over 250,000 acres or approximately 13 percent of the San Juan National Forest has been systematically inventoried for archaeological resources. Records for approximately 700 archaeological resources are currently on file; perhaps twice that many properties will have been recorded by the time the inventory is completed.

Protection efforts to date have been geared towards ensuring that archaeological resources are not damaged through the activities of other resource programs.

Prior to ground-disturbing management activities, project sites are surveyed for archaeological and historical significance. Protection measures are undertaken whenever a cultural resource site is found. The Forest Archaeologist, academic institutions, and private consultants are inventorying the Forest through permits or in conjunction with proposals of ground-disturbing activity.

The Chimney Rock Archaeological Area and the Durango and Silverton Narrow Gauge Railroad are currently the only two areas on the San Juan National Forest that are listed on the National Register of Historic Places. The Durango and Silverton Narrow Gauge Railroad is also a National Historic Landmark. Only Chimney Rock is directly managed by the Forest. The Spring Creek drainage was recently nominated for National Register listing and several more of the Forest's historic and prehistoric resources will probably be nominated over the next few years. Chimney Rock is presently managed with emphasis for wildlife, recreation, and archaeology research purposes.

Demand Trends - Ground-disturbing activities will increase, creating a greater demand for the cultural surveys required for these projects. Evaluation of sites by consultants, or academic institutions, is likely to increase and eventually to complete the classification of all sites on the Forest. The thrust of future cultural resource management will be to protect against vandalism and looting and to complete the inventory of the San Juan National Forest.

Visual Resources

The San Juan National Forest is characterized by outstanding scenery. Interest in management of the visual resource is increasing.

Current Management - Visual quality on the Forest has been altered due to activities such as road building, timber harvesting, and vegetation manipulation projects. Quality objectives have been maintained through use of the Visual Management Program in resource management activities on a project-by-project basis.

Approximately 48 percent of the Forest has been altered by man to the degree that it is visually evident to the Forest visitor. Fifty-two percent of the Forest has had very minor to no alteration. There is only an estimated eight percent that visually dominates and contrasts with the natural appearing landscape. Examples of this are developments such as highways roads, utilities, mineral, gas and oil activity, timber clearcutting, and developed recreation sites.

Demand Trends - Demands for, and concerns about, scenic quality are increasing. Visual quality of San Juan National Forest lands viewed from recreation sites and major travelways will become increasingly important. Visual resource management techniques will continue to be applied to all projects in the future, with specific emphasis on those areas identified by the Forest Plan as high in scenic quality or recreation visitor use.

WILDERNESS

The San Juan National Forest presently contains 360,684 acres of designated wilderness. This accounts for nearly 20 percent of the Forest and is distributed among the Weminuche, the Lizard Head, and the South San Juan Wildernesses. The South San Juan Wilderness Expansion, Piedra and the West Needle Wilderness Study Areas comprise an additional 90,100 acres to be studied for possible inclusion into the National Wilderness Preservation System.

Existing Wilderness

As discussed in Chapter I, page I-3, because of the need for uniform management direction on designated wildernesses that have parts on more than one Forest, this draft EIS will develop management direction for each entire wilderness. Therefore, the following describes each wilderness in total. Table III-4 shows area and use by Forest for each wilderness.

Current Use and Management - The Weminuche Wilderness now contains 463,324 acres (294,284 acres on the San Juan National Forest). It was originally designated in 1975 although it had been managed since 1932 as the San Juan Primitive Area. The Weminuche stretches along the Continental Divide from Stony Pass on the north to near Wolf Creek Pass on the south. Approximately 497 miles of light to heavy use trails provide access into the area. In the past decade, recreation use has risen greatly to almost 200,000 RVD's in 1980 with areas such as Chicago Basin, Johnson Creek, and Flint, Goose, Trout, Ute, and Emerald Lakes receiving heavy recreation use. Direct controls such as camping restrictions have been necessary on some areas around Emerald Lake. The Weminuche is very popular for commercial outfitter-guides who generate over 10 percent of the annual use in the form of hunting, fishing, photography and sightseeing trips. There is low interest both in mineral exploration and oil and gas leasing in the area.

The 40,000-acre Lizard Head Wilderness (21,400 acres on the San Juan National Forest) was created out of parts of the Wilson Mountains Primitive Area and adjacent areas by an Act of Congress in December 1980. Impressive rock outcrops and high mountain terrain with peaks over 14,000 feet characterize this area. Cirque lakes and swift flowing streams are also present and some contain cutthroat, rainbow, and brook trout. Extensive vistas and large areas of alpine and spruce-fir vegetation are present. Approximately 19 miles of, at times, steep trails provide access for light to moderate recreation use. There is low interest in mineral exploration and high interest in oil and gas leasing.

The South San Juan Wilderness, designated in 1980, crosses the Continental Divide in the San Juan Mountains. The 133,463 acre area (45,000 acres on the San Juan) contains bottomlands, canyons, glaciated uplands, uneven mountains and high hills. Some of the area is above timberline. The Conejos, San Juan and Blanco Rivers originate in the area. Vegetation includes a variety of grasses, shrubs, spruce, fir, aspen and various alpine plants. One hundred and sixty-four miles of trails provide access for hunting, fishing, sight-seeing, and grazing. The area is currently receiving light recreation use which is expected to rise as a result of wilderness designation. There is low interest in both mineral exploration and oil and gas leasing in the area.

Demand Trends - Future wilderness use can be expected to rise during the next decade at nearly the historic rate of increase. Changes in this rate beyond the next few years will depend on factors such as travel costs and leisure time.

TABLE III-4

Current (1980) Wilderness Uses

	Thousand Visitor Days	Trail Miles	Thousand Animal Unit Months	Water Yield Thousand Acre-Feet/ Year
Lizard Head				
San Juan - 21,400 acres	13	15	1.2	37.0
Uncompahgre - 18,600 acres	8	4	.9	32.8
Total 40,000 acres	21	19	2.1	69.8
Weminuche				
San Juan - 294,284 acres	121	305	9.1	516.4
Rio Grande - 168,940 acres	72	192	6.8	219.1
Total 463,224 acres	193	497	15.9	835.5
South San Juan				
San Juan - 45,000 acres	5	60	2.2	68.2
Rio Grande - 88,463 acres	30	104	7.1	111.2
Total 133,463 acres	35	164	9.3	179.4

*Includes visitor days for those areas that were designated wilderness during 1980.

Under existing legislation, mineral exploration and development can continue until December 31, 1983, at which time the lands will be withdrawn from further mineral entry and leasing. Grazing use, on the other hand, is expected to remain steady or increase slightly if the sheep market improves. On some vegetation types, grazing capacity will decline due to natural succession of trees into existing forage-producing areas.

Wilderness Study Areas

In 1977 the Forest Service began a Nation-wide Roadless Area Review and Evaluation (RARE II) to identify roadless and undeveloped areas within the National Forest System which were suitable candidates for inclusion in the National Wilderness Preservation System. Thirty-eight areas were inventoried on the San Juan National Forest; over 300 areas were inventoried in Colorado.

The Colorado Wilderness Act of 1980 (P.L. 96-560) was a direct result of RARE II. In the Act, three areas on the San Juan National Forest, West Needle, Piedra, and South San Juan Wilderness Expansion (Montezuma Peak - V Rock Trail) were established as Wilderness Study Areas (See Figure III-2). This act requires the Secretary of Agriculture to review the study areas and make recommendations as to the suitability or unsuitability of inclusion into the National Wilderness Preservation System by December 31, 1983.

Each Wilderness Study Area has been analyzed and an identification made as to the suitability or unsuitability for wilderness. Until Congress decides, the areas will be managed to preserve their wilderness character.

The following is a brief discussion of each Wilderness Study Area. More detailed information may be found in Appendix N, Wilderness Study Area Information.

West Needle Wilderness Study Area - The West Needle Wilderness Study Area (WSA) is located in San Juan and La Plata Counties between the towns of Durango and Silverton. Major access to the study area is by State Highway 550 and the Durango and Silverton Narrow Gauge Railroad. There are 13 existing wildernesses within a 100-mile radius totaling 1,383,354 acres; 11 of these are in the National Forest System, and 2 are within the National Park System.

The West Needle WSA consists of 15,800 acres of National Forest System lands. Under an Interagency Cooperative Study Agreement, the analysis for the WSA includes the West Needle Contiguous Study Area, a 5,780 acre parcel presently administered by the Bureau of Land Management (BLM). The total National Forest System land and Bureau of Land Management land is 21,580 acres.

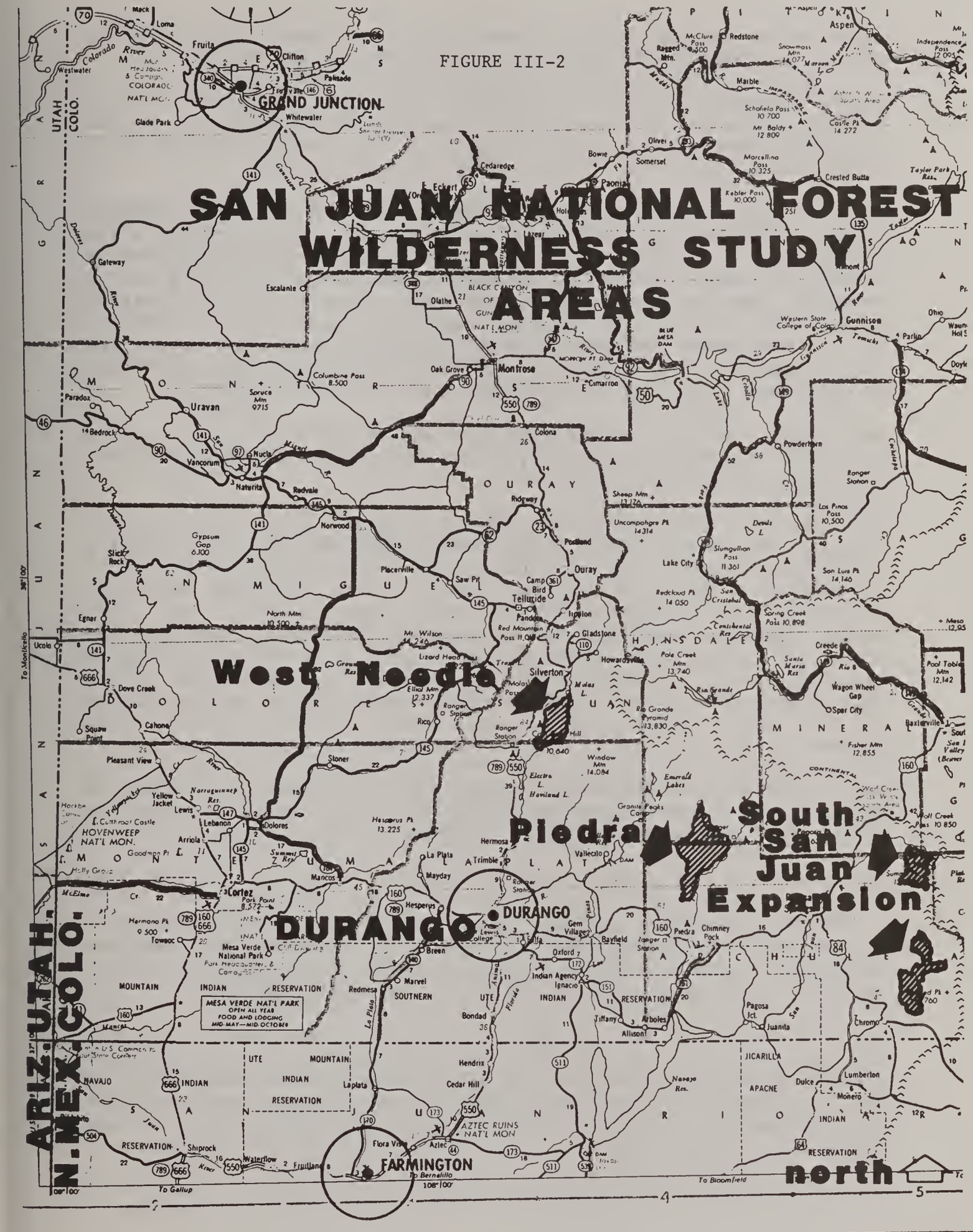
The Needle Mountains contain some of the most rugged peaks in the entire San Juan Mountain Range. Features include areas of virgin forest, cascading streams, lofty ridges, distinctive canyons, and alpine basins containing lakes and ponds. The WSA ranges in elevation from about 8,000 to 13,160 feet, with five peaks over 13,000 feet.

Climate is typical of the high Rockies with short cool summers and long severe winters with heavy snows.

A variety of recreation opportunities occur, including camping, horseback riding, hiking, rock climbing, nature study, hunting, and fishing. Current recreation use is estimated at 8,500 RVD's.

The area is considered to be of low archaeological and historic sensitivity due to rugged topography and extreme climatic conditions.

Elk, deer, mountain goat, black bear, and possibly mountain lion inhabit the area. Smaller mammals and birds are plentiful. Domestic and recreation livestock, as well as wildlife, use the area for forage. There are no identified threatened or endangered animal or plant species.


FIGURE III-2
SAN JUAN NATIONAL FOREST
WILDERNESS STUDY
AREAS
West Needle
Piedra
South San Juan Expansion
DURANGO
GRAND JUNCTION
FARMINGTON
ARIZ. UTAH. N. MEX. COLO.
north
MESA VERDE NAT'L PARK
OPEN ALL YEAR
FOOD AND LODGING
MID-MAY—MID-OCTOBER
HOVENWEEP NAT'L MON.
AZTEC RUINS NAT'L MON.
BLACK CANYON OF GUNNISON NAT'L MON.
Colorado River
Animas River
Dolores River
San Juan River
Rio Grande
Uncompahgre Pk 14,314
Sheep Mtn 13,176
Redcloud Pk 14,050
Sunshine Pk 14,001
Mt Wilson 14,246
Lizard Head Pass
Wilson Mesa
Lone Cone
Mt Sneffels 14,150
Gilpin Peak 13,361
Engineer Mtn 13,615
Grays Peak 14,274
Torreys Peak 14,267
Mt Evans 14,264
Longs Peak 14,255
Pikes Peak 14,110
Mt Elbert 14,431
Mt Massive 14,421
Mt Harvard 14,420
Blanca Peak 14,345
Crestone Peak 14,294
Crestone Needle 14,197
Kit Carson Mtn 14,165
Challenger Pt 14,189
Culebra Peak 14,047
Mt Lindsey 14,042
Ellingwood Pt 14,042
Little Bear Peak 14,037
Mt Adams 14,931
Mt Wetterhorn 14,015
Redcliff
Leadville
Buena Vista
Salida
Canon City
Pueblo
Colorado Springs
Monument
Palmer Lake
Woodland Park
Cripple Creek
Victor
Florence
Penrose
Fountain
Manitou Springs
Fort Carson
Peterson Field
Air Force Academy
Falcon
Calhan
Ramah
Simla
Limon
Hugo
Kiowa
Elbert
Parker
Castle Rock
Franktown
Larkspur
Palmer Divide
Monument Hill
Black Forest
Ellicott
Yoder
Peyton

Fisheries of the WSA include streams and alpine lakes. Stream fishing is poor, and alpine lake fishing is rated as being fair to good.

Domestic sheep graze about 15 percent of the area. The current annual grazing use totals 590 animal unit months, 360 of which are on the National Forest portion. The majority of the range is in "fair" or better condition.

About 40 percent is forested, with Engelmann spruce being the dominant species. The remainder is occupied by grasslands, rocky areas and a few wetland areas. Of the total 21,580 acres, 3,800 acres or 18 percent is capable of timber production, although production potential is low to moderate. Most of the capable forest land occurs on 30 to 60 percent slopes. The inventory of existing timber on capable forest lands is 37.3 million board feet most of which is in the spruce-fir type. The land is generally considered not feasible for timber production because of the rugged topography and scattered nature of timber stands.

Water yield from the area averages about 33,800 acre-feet per year. Two power-site withdrawals are located within the area, although there are no current proposals for development.

The potential for significant mineral deposits exists on the WSA, although there are no known major economic deposits and little activity on existing claims. Of the total 21,580 acres (BLM and FS), 20,210 acres have a high to moderate potential for locatable minerals. Presently, 502 unpatented mining claims cover 10,340 acres. The geology indicates that it has a low potential for leasable minerals. No leases or lease applications for oil, gas, or geothermal resources currently exist. If designated as wilderness under provisions of the 1964 Wilderness Act, the 21,580 acre WSA would be withdrawn from mineral location and leasing, subject to valid existing rights, after December 31, 1983.

One section of land (640 acres) within the WSA is owned by the State of Colorado. This section has been identified as a desirable tract for acquisition into the National Forest System.

Table III-5 gives selected current resource information for the WSA.

The Wilderness Attribute Rating System (WARS) was developed in RARE II to indicate relative ratings of wilderness quality. The WARS was designed to minimize subjective quality measures by confining ratings to criteria specifically mentioned in the Wilderness Act of 1964.

The WARS rating for the 300 RARE II areas in Colorado ranges from 12 to 26 with a median of 19. The rating scale ranges from 4 to 28. The West Needle WSA has a WARS rating of 21, which is among the highest of the 38 RARE II areas on the San Juan National Forest. This places it in the top five percent of Colorado RARE II areas. The rating was reconfirmed during this planning effort.

TABLE III-5

West Needle and West Needle Contiguous Study Area Data

Gross Acres	21,580
Net Acres - National Forest (15,800), BLM (5,780)	21,580
Timber (Acres capable for timber production)	
Pine	0
Spruce-fir	3,213
Douglas-fir	115
Aspen	480
	3,808
Growing Stock Volume (Thousand board feet)	
Hardwood (Aspen)	2.5
Softwood	34.8
Grazing (Animal unit months)	
Sheep	590
Cattle	Minor amounts
Present Dispersed Recreation (Recreation visitor days)	
Motorized	500
Non-motorized	8,000
Annual Water Yield (Acre-feet)	33,800

Piedra Wilderness Study Area - The Piedra WSA is located in Archuleta and Hinsdale Counties between the towns of Durango and Pagosa Springs. The area consists of 41,500 acres of unroaded and undeveloped Forest system lands. There are 15 existing wildernesses within a 100-mile radius totaling 1,303,605 acres. Twelve of these are in the National Forest System and three are within the National Park System.

The area is characterized by moderately broad slopes and valleys covered by ponderosa pine, spruce-fir and aspen. Topography is rolling to steep, all below timberline, with no significant high points or peaks. One of the most prominant features in the area is the Piedra River. Elevation ranges from 6,820 to 10,520. Climate is typical of the southern Colorado Rockies with cool summers and cold winters with heavy snows.

A variety of recreation opportunities occur including camping, horseback riding, hunting, fishing, and white water boating. Current recreation use is light consisting of 6,100 RVD's. There are approximately 55 miles of trail within the WSA.

The area is considered to have low to moderate archaeologic and historic sensitivity.

Big game species presently occupying this area include elk, mule deer, black bear, and mountain lion. Small game and birds are plentiful. This area contains a major migration route for elk and deer. The fishing is considered good. The river otter, a State endangered species, was reintroduced into the Piedra River in 1978.

Cattle graze on about 70 percent of the area. Current grazing totals about 2,860 AUM's. The majority of the range is in satisfactory condition. There are presently few structural range improvements.

About 95 percent of the area (40,018 acres) is classified as capable for timber production, with Engelmann spruce, true fir, and Douglas-fir at higher elevations and ponderosa pine at the lower elevations. Aspen stands are found throughout the WSA. The vast majority of existing timber (95 percent) consists of sawtimber size trees. Most of the remaining area consists of grassland and rocky or barren areas. Timber production potential is estimated to be fair to good. There is an estimated existing timber volume of 309 million board feet.

Water yield averages 41,500 acre-feet per year with good to excellent water quality. The water drains into the Piedra River which flows through the WSA. A power site withdrawal extends the length of the Piedra River within the area.

Approximately nine hundred acres have a high to moderate potential for locatable minerals. Twelve unpatented mining claims cover approximately 250 acres. About 1020 acres in the extreme southern tip of the area are now under application for oil and gas leases. Five leases have been applied for; however, no leases have been issued, and no geophysical exploration activity has been proposed to date. If designated as wilderness under provisions of the 1964 Wilderness Act, the 41,500 acre study area would be withdrawn from mineral location and leasing subject to valid existing rights after December 31, 1983. Of the total acreage, 1,450 acres have a high to moderate potential for leasable minerals.

All lands within the 41,500 acre WSA are National Forest System lands.

Table III-6 gives selected current resource information for the study area.

The Piedra WSA has a WARS rating of 24, which is the highest of the 38 RARE II areas on the San Juan National Forest. This places it in the top five percent of Colorado RARE II areas. The rating was reconfirmed during this planning effort.

South San Juan (Montezuma Peak-V Rock Trail) Wilderness Expansion Study Area - The South San Juan Wilderness Expansion Study Area (WSA) is located in Archuleta, Mineral, Rio Grande, and Conejos Counties, east of Pagosa Springs. It is composed of two separate areas, one to the north (Montezuma Peak) and one to the south (V-Rock Trail) of the existing South San Juan Wilderness. The area consists of 32,800 acres of unroaded and undeveloped National Forest System lands. There are 19 wildernesses totaling 1,666,968 acres within a 100-mile radius. Fifteen of these are in the National Forest System and four within the National Park System.

TABLE III-6

Piedra Wilderness Study Area Data

Gross Acres	41,500
Net Acres	41,500
Timber (Acres capable for timber production)	
Pine	1,024
Spruce-fir	7,064
Douglas-fir	20,986
Aspen	10,944
	40,018
Growing Stock Volume (Thousand board feet)	
Hardwood (Aspen)	28,500
Softwood	280,500
	309,000
Grazing (Animal unit months)	
Sheep	Minor amounts
Cattle	2,860
Present Dispersed Recreation (Recreation visitor days)	
Motorized	100
Non-motorized	6,000
Annual Water Yield (Acre-feet)	41,500

The area is characterized by varied terrain of high elevation landscapes which range from forested slopes with benches of large open parks to rugged peaks above timberline. The elevations range from 8,200 feet to 13,150 feet. Climate is typical of the high southern Rocky Mountains with short cool summers and long severe winters with heavy snows.

Current recreation activities include hunting, fishing, hiking, and riding; use is light consisting of 5,200 RVD's. There are approximately 35 miles of trail within the WSA.

The area has low to moderate archaeological and historical sensitivity.

Big game species presently utilizing the area are elk, big horn sheep, mule deer, black bear, and possibly mountain lion. Small game and birds are also plentiful. Habitat for three threatened or endangered species occurs in this WSA; however, none of the species are presently known to exist. The species are: grizzly bear, river otter, and peregrine falcon. Fishing in lakes such as Opal is considered good; however, stream fishing is limited.

Cattle and horses graze on about 30 percent of the combined area with sheep utilizing about 20 percent of the southern section (V-Rock Trail). Current range condition is satisfactory. The majority of the range is in satisfactory condition and the trend is generally stable. There are relatively few structural improvements.

About two-thirds, or 22,130 acres, is considered capable timber production land with Engelmann spruce and scattered stands of aspen. Seventy percent is stocked with sawtimber size trees. Grasslands make up about 10 to 20 percent of the area, and the remainder is primarily rock. Timber production potential is fair. There is an existing timber volume of 254 million board feet.

Water yield from the area averages 47,945 acre-feet per year flowing into the San Juan River. Water quality is considered good.

Interest is high in the mineral resources. Approximately 27,700 acres have a high to moderate potential of either leasable or locatable minerals. There are currently two patented mining claims (30 acres), 165 unpatented mining claims (3,399 acres), seven existing oil and gas leases (3,320 acres), and three oil and gas lease applications (2,940 acres). If designated as wilderness under provisions of the 1964 Wilderness Act, the area would be withdrawn from mineral location and leasing, subject to valid existing rights after December 31, 1983.

Except for 30 acres of patented mining claims, all lands within the 32,800-acre WSA are National Forest System lands.

Table III-7 gives selected current resource information for the Study Area.

The WARS rating for the Montezuma Peak portion is 20 which is fifteenth among the 38 RARE II areas of the San Juan National Forest, and the rating of 17 for the V-Rock Trail portion is twenty-fifth among the 38 RARE II areas. These ratings were reconfirmed during this planning effort.

FISH AND WILDLIFE

Wildlife

Current Use and Management - In 1980, the San Juan National Forest provided 107,600 RVD's of hunting, 91,600 of which were for big game. Non-consumptive wildlife use constituted 10,000 RVD's. Total wildlife related recreation made up approximately seven percent of the total recreation use of the San Juan National Forest.

A set of management indicator species has been selected to reflect the habitat management needs for the majority of the species inhabiting the San Juan National Forest. The criteria for selection of management indicator species are:

TABLE III-7

South San Juan Wilderness Expansion Study Area Data

Gross Acres	32,800
Net Acres	32,770
Timber (Acres capable for timber production)	
Pine	0
Spruce-fir	15,282
Douglas-fir	1,852
Aspen	4,997
	22,131
Growing Stock Volume (Thousand board feet)	
Hardwood (Aspen)	3,400
Softwood	251,000
Grazing (Animal unit months)	
Sheep	263
Cattle	1,274
Present Dispersed Recreation (Recreation visitor days)	
Motorized	200
Non-motorized	5,000
Annual Water Yield (Acre-feet)	47,945

1. Public issues or management concerns expressed, concerning certain species or groups of species.

2. Endangered or threatened species listed either nationally or by the State of Colorado.

3. Economically important species that are either hunted, fished, or trapped.

4. Species that have limited or special habitat requirements that may be significantly influenced by management practices resulting from land use allocation.

5. Species that represent the habitat requirements for a larger group of species.

The species that have been selected have been grouped into three categories of habitat: Group A, those species needing early successional ecological stages of vegetation; Group B, those species needing late successional ecological stages of vegetation; and, Group C, those species that have unique or special habitat requirements; i.e., snags, rock fields or specific vegetation type(s).

The following list shows the management indicator species selected for each group along with a brief explanation of the reason for selection.

Group A - Early Succession

Elk - Economically important and public issue.
Mule Deer - Economically important and public issue.
Black Bear - Economically important and represents a large group of species.
Merriam's Turkey - Limited habitat on the San Juan National Forest that will readily monitor change.
Sharp-tailed Grouse - Very limited habitat on San Juan National Forest.
Green-tailed Towhee - Unique habitat that can be monitored.
Deer Mouse - Unique habitat and represents a large group of species.
Rocky Mountain Bighorn Sheep - Unique and limited habitat, economically important and habitat can be monitored.

Group B - Late Succession

Black Bear - Economically important and represents a large group of species.
Marten - Unique habitat that can be easily monitored.
Abert's Squirrel - Unique habitat that can be easily monitored.
Snowshoe Hare - Unique habitat and environmentally sensitive.
Hairy Woodpecker - Unique habitat that can be monitored.
Ruby Crowned Kinglet - Represents a large group of species.

Group C - Unique or special habitat requirements.

Peregrine Falcon - Endangered and environmentally sensitive.
Bald Eagle - Threatened and environmentally sensitive.
White-tailed Ptarmigan - Unique habitat that can be monitored.
Mallard Duck - Economically important and wetland habitat indicator.
River Otter - Endangered on Colorado State list.
Mountain Bluebird - Unique habitat that can be monitored.
Cutthroat Trout - Most restrictive habitat requirements of the Salmonidae.

Management of these habitats is an on-going effort in cooperation with the Colorado Division of Wildlife. Management programs are directed toward improving big game winter ranges, maintaining and regenerating aspen stands as ecosystem components, improving riparian habitats, and using timber sales to improve wildlife habitat diversity.

The Comprehensive State-wide Wildlife Management Plan for National Forest System Lands in Colorado develops priorities for specific wildlife project work.

Specific wildlife considerations are now incorporated into timber sales. In 1980, through silvicultural treatment programs, the Forest improved 8,241 acres of wildlife habitat, prescribe burned 6,300 acres, applied aspen regeneration practices on 800 acres and created 600 snags. In addition 25 structures, primarily water developments, were constructed. Three projects to coordinate livestock grazing with riparian wildlife habitat are in progress.

The variety of topography and climate that occurs within the San Juan National Forest provides habitats for many species of mammals, birds, reptiles, amphibians, and fish. General groupings of the vertebrate species that occur on the San Juan National Forest, including migratory birds and their game status, are shown in Table III-8. A complete species list and summary of habitat relationships is included in the Wildlife Data Input to the San Juan National Forest Land and Resource Plan.

TABLE III-8

Number of Vertebrate Species

	Total Species	Game and/or Furbearing Species
Mammals	65	22
Birds*	238	33
Reptiles	8	0
Amphibians	6	0
Fishes	16	7

*Includes migratory birds.

Estimated 1980 populations of the primary species of game animals on the San Juan National Forest are indicated in Table III-9. With the exception of turkey, no specific information on population numbers of small game and non-game species exists.

There is approximately 650,000 acres of big game winter range on the San Juan National Forest of which 95,000 acres are classified as key winter range. The Forest winter range is especially important as winter ranges on adjacent private lands are being lost or impacted because of developments and other conflicting uses.

TABLE III-9

Populations of Game Species

Species	Estimated Population 1980
Bighorn sheep	220
Black bear	1,200
Elk	9,700
Mountain lion	70
Mule deer	16,250
Turkey	330
Mountain goat	80

Demand Trends - Some general assumptions concerning future wildlife management on the San Juan National Forest are listed below:

-Consumptive and nonconsumptive use of wildlife in the future is expected to increase and to meet or exceed supply.

-Small game hunting will become more popular requiring additional maintenance and improvement of small game habitat.

-The Forest Service will be called upon to improve the quality of big game winter range on the San Juan National Forest as more adjacent winter range is lost to development.

-Non-consumptive uses of wildlife such as viewing, bird watching and photographing will increase as consumptive uses become more restricted.

Fish

Current Use and Management - In 1980, cold water fishing on the San Juan National Forest provided 136,700 RVD's. Total fish related recreation made up about 9 percent of the total recreation use of the Forest.

There are presently 16 species of fish of which seven are classified as game fish.

There are approximately 281 perennial fishing streams totaling about 1,215 miles, 94 natural lakes and 10 reservoirs on the San Juan National Forest. A majority of the stream habitat is of poor quality because of steep gradients and high yearly fluctuation of flow. Current inventories indicate approximately 236 miles of stream where improvement of the habitat could be accomplished on an cost-effective basis. The majority of the natural lakes on the San Juan National Forest occur in wildernesses. There are only a few opportunities to improve cold water fish habitat in lakes or ponds as presently inventoried.

The Comprehensive State-wide Wildlife Management Plan for National Forest System Lands in Colorado sets priorities for fish habitat related work. Management of these habitat is an on-going effort in cooperation with the Colorado Division of Wildlife.

Management programs are directed toward improving riparian habitat, bringing stream fisheries up to potential productivity and identifying non-inventoried pond and lake sites where fish habitat may be improved.

Additional inventory and project work is being planned whereby improvement of riparian habitat conditions through coordination with timber, range, recreation, watershed, and transportation programs will improve cold water fish habitat.

Fisheries habitat was improved through the construction of four structures on one mile of stream in 1980. Three projects to coordinate livestock grazing in riparian habitats are in progress to develop fish habitat.

Demand Trends - General assumptions concerning future fishery management on the San Juan National Forest are listed below:

-Fishing pressure will increase beyond the supply, especially on waters outside wilderness.

-As fishing pressure continues to increase, specific fish habitats in the wilderness will become over-utilized because of their low productivity potential.

-More uniform distribution of fishing pressure on fish habitats can more effectively utilize limited production potential.

-The Forest Service will be called upon to provide fish habitat in low elevation, highly productive ponds and lakes.

Threatened and Endangered Species

Current Use and Management - The Endangered Species Act of 1973 requires that all Federal agencies attempt to protect and manage threatened and endangered species and their habitats.

Wildlife

The San Juan National Forest has the following Federal or State designated threatened or endangered wildlife species:

Common Name	Latin Name	Designation
American peregrine falcon	Falco peregrinus anatum	endangered-Federal
Bald eagle	Haliaeetus leucocephalus alascanus	endangered-Federal
Colorado River cutthroat trout*	Salmo clarki pleuritcus	threatened-State
River otter	Lutra canadensis	endangered-State
Grizzly bear*	Ursus arctos	threatened-Federal
Wolverine*	Gulo gulo	endangered-State

* Uncertain existence on San Juan National Forest

At present, there are 21 prime inventoried sites on the San Juan National Forest that have been recommended as essential habitat for peregrine falcon. One of these sites is an active eyrie and another is being used as a hack site for reintroduction purposes. Six areas of winter roosting sites for bald eagles have been identified. These areas are primarily on private lands adjacent to or intermingled with the San Juan National Forest.

A cooperative research study with the Colorado Division of Wildlife is presently under way on nearly 80,000 acres to determine if grizzly bear exist on the San Juan National Forest and to classify possible habitat. This area is presently being managed under Management Situation 2 of "Guidelines for Management Involving Grizzly Bears in the Greater Yellowstone Area" until the presence or absence is confirmed. Habitat for the river otter has been identified, and a multi-year transplanting program is presently in progress.

Plants

There are no known threatened or endangered plant species found on the San Juan National Forest. Starwort, Stellaria irrigua and Bladder pod, Lesquerella pruinosa were in the "Proposed and Recommended Threatened and Endangered Plant Species of the Forest Service, Rocky Mountain Region, 1979." After additional populations were found, these were removed from this list. Both Mesa Verde Cactus, Sclerocactus mesae-verdae and Knowlton's hedgehog cactus, Pediocactus knowltonii are listed as threatened and endangered, respectively, in the Federal Register on October 29, 1979. Neither species has been found within 10 miles of the Forest and potential habitat for them has not been identified on the Forest.

Demand Trends - General assumptions concerning future management of threatened and endangered species on the San Juan National Forest are listed below:

-The Forest Service will continue to fulfill its responsibilities under the Endangered Species Act.

-A sizable portion of the general public will continue to demand that threatened and endangered species and their habitats will be maintained and improved.

-If the determination is made that grizzly bear do exist on the San Juan National Forest, the Forest Service may be required to alter its management on potential grizzly bear habitat.

-A limited number of organizations will demand that grizzly bear be transplanted into the area to either supplement a population or to establish a population.

-The demands for commodity products will continue to be in conflict with certain threatened and endangered species habitat requirements.

-Conflicts with threatened and endangered species management will continue to increase especially as mineral, oil and gas, and coal exploration and extraction increase.

Wildlife Habitat Diversity

Current Use and Management - Wildlife habitat diversity is related to vegetation diversity through both its composition and its structural complexity. In addition, the interspersion and juxtaposition of both the composition and its various structural stages are used to determine the overall wildlife habitat diversity.

Terrestial wildlife habitats can be described generally as either forested or nonforested. Percentage breakdown of forested and non-forested habitats by species on the Forest are displayed in Table III-10.

Wildlife habitat diversity has been determined on each of the fourth order watersheds on the Forest. Fourth order watersheds are for a common land base on which to monitor vegetation manipulation practices for water yield purposes and for wildlife habitat diversity purposes.

The present diversity ratings of wildlife habitat diversity for these watersheds are summarized in Table III-11.

TABLE III-10

Percent of Forested and Non-forested Habitats on the San Juan National Forest

Forested		Non-forested	
Aspen	17.5	Oakbrush	4.8
Douglas fir-white fir	10.5	Mixed browse	0.6
Ponderosa pine	14.0	Sagebrush	0.7
Spruce-fir	30.0	Sonoran grass	5.1
Lodgepole pine	0.1	Montane grass	0.8
		Alpine mesic	0.3
Total	72.1	Alpine xeric	0.4
		Pinon-juniper	0.3
		Meadow	0.6
		Barren rock	11.5
		Riparian	2.7
		Water	0.1
		Total	27.9

TABLE III-11

Wildlife Habitat Diversity by Watersheds

Diversity Rating	Number of Watersheds	Acres	Percent of Total Acres
Low	21	217,856	11.7
Moderate	61	713,663	38.2
High	69	936,263	50.1
Totals	151	1,867,782	

Through interpretations of existing data and field observations, it appears that the majority of the San Juan National Forest has good to excellent inherent vegetation composition and diversity.

Structural diversity problems occur in large uncut spruce-fir areas, large continuous blocks of aspen, past clearcuts in spruce-fir, and non-regenerated ponderosa pine areas. However, in the majority of these

areas, there is a good interspersion of meadows, openings from tree cutting, uncut trees, and other species and size types. Oakbrush areas lack the structural and vegetation diversity desired in some cases.

Aspen is a key habitat for many wildlife species. The maintenance, expansion, and renewal of aspen stands is important for habitat diversity. Generally, the aspen on the San Juan National Forest is overmature and in need of renewal as a result of limited cutting.

Alpine and rockland non-forested habitats are in good condition. Only a few activities, primarily dispersed recreation, affect their wildlife habitat values. The mountain shrub and grassland habitats are in fair to good condition, with a few areas of livestock-big game competition.

Riparian habitat is especially important for wildlife and fish. A partial inventory of the Forest indicated problems with excessive domestic livestock grazing and off-road vehicle use. A more substantive analysis cannot be made until the inventory is completed.

Without freedom from human disturbance, wildlife cannot benefit fully from improved habitat diversity. Habitat effectiveness is influenced by the amount of human use and activities that occur within an area. The frequency and time of year of disturbance are also important factors.

Demand Trends - Some general assumptions concerning future wildlife habitat diversity management on the San Juan National Forest are listed as follows:

-The Forest Service will continue to be required by legislation to provide adequate diversity to maintain minimum viable populations of wildlife and fish species presently occupying the San Juan National Forest.

-Wildlife habitat diversity will continue to be an important aspect affecting wildlife species diversity and population levels.

-Identified management indicator species will continue to require established levels of wildlife habitat diversity in order to maintain minimum viable populations.

-Wildlife habitat diversity objectives will continue to be in conflict with most high commodity output objectives.

RANGE

Of the 1,867,782 acres of the San Juan National Forest that are open to grazing, about 866,000 acres are classified as capable and suitable livestock grazing rangeland. There are about 145,500 acres in unsatisfactory range condition.

Current Use and Management - Grazing of livestock on the San Juan National Forest is still a major use. The local economy depends heavily on ranching and stock-raising. The number of livestock grazing on the Forest represents one-third of the total cattle and sheep in the five-county area (See Table III-12). The majority of the cattle are permitted on the Forest from mid-May to mid-October. The majority of the sheep are permitted from early July to mid-September. The majority of horses are grazed in conjunction with various kinds of recreation activities that occur primarily between mid-May and early November.

TABLE III-12

Authorized Grazing - 1980

Grazing System	Number of Livestock			Animal Unit Months (AUM's)*		
	Cattle	Horses	Sheep	Cattle	Horses	Sheep
Extensive Grazing (season-long)	2,470	3,434	10,812	11,175	2,246	9,400
Intensive Grazing (rest or deferred-rotation)	28,597	18	40,555	127,400	105	25,891
Total	31,067	3,452	51,367	138,575	2,351	35,291

*AUM = The quantity of forage required by one mature cow (1,000 lbs.) or the equivalent per month.

It is a Forest goal to maintain all rangeland in satisfactory range condition. Present activities focus on three considerations:

-Continuation of 160,000 to 180,000 animal unit months of grazing annually while attaining satisfactory range condition and being cost-effective.

-Resolution of people-livestock and wildlife-livestock conflicts.

-Identification and correction of riparian habitat degradation caused by livestock.

There are 219 livestock grazing allotments on the San Juan National Forest broken down as follows: 145 cattle and horse allotments, and 74 sheep and goat allotments. Thirty-two of the allotments are vacant; 28 are available to be stocked and grazed by livestock, and 4 are currently not available for restocking because of restoration projects.

Forest-wide, stocking is within estimated carrying capacity except for 22 cattle and horse allotments and 6 sheep and goat allotments which are considered to be overstocked or have management problems. Overall, trend of range conditions is improving across the Forest.

The increase in vegetation diversity achieved through silvicultural activities and oakbrush management will have a favorable effect on livestock production through providing increased grazing opportunities.

Demand Trends - The number of cattle grazing on the Forest has remained fairly steady over the past few years; however, because of the changing sheep markets, the number of sheep has fluctuated greatly.

A number of assumptions can be made about the future of grazing on the San Juan National Forest.

-The demand for permits for cattle grazing will remain high and will exceed the available supply.

-Demand for sheep permits will fluctuate over time but will rise to exceed the supply.

-The dependency on Forest lands for grazing will increase as more private land is converted from rangeland to other uses.

-The demand for forage for recreation horses will continue to increase as recreation use increases. Overall, supply will exceed demand except in high use recreation areas.

-Conflicts will increase between grazing and other resource uses.

TIMBER

The amount of land available, capable, and tentatively suitable for timber production has been determined. Table III-13 accounts for all acres in the San Juan National Forest, giving a total of 801,474 tentatively suitable acres for timber production. Figure III-3 is a graphical display of the land classifications shown in the table. Appendix L provides additional information and compares lands in the various categories with the previous (1976) Timber Management Plan prepared by the San Juan National Forest.

Current Use and Management - From 1915 to 1980, 1,853 million board feet (MMBF) of timber have been harvested from the San Juan National Forest. In recent years, from 1960-1980, 1,107 MMBF have been harvested, or an average of approximately 53 MMBF per year. Harvest volumes in recent years have varied from 97,932 MBF in 1969 to 22,300 MBF in 1980.

The average annual sale and harvest of the timber resource has been declining recently; the number of major timber processors has declined also. The Montezuma Plywood Company in Dolores, with a capacity of 30 MMBF annually, closed in 1976. San Juan Lumber Company's operation in Pagosa Springs, which used about 25 MMBF, has not operated since 1978. Its operation in Durango currently uses about 10 MMBF, down from about 18 MMBF in 1978.

FIGURE III-3

Lands Suitable for Timber Production

	Acres
Total Forested Area on the San Juan National Forest (the total forested area accounts for 72% of the total 1,867,782 acres on the San Juan National Forest)	1,346,562

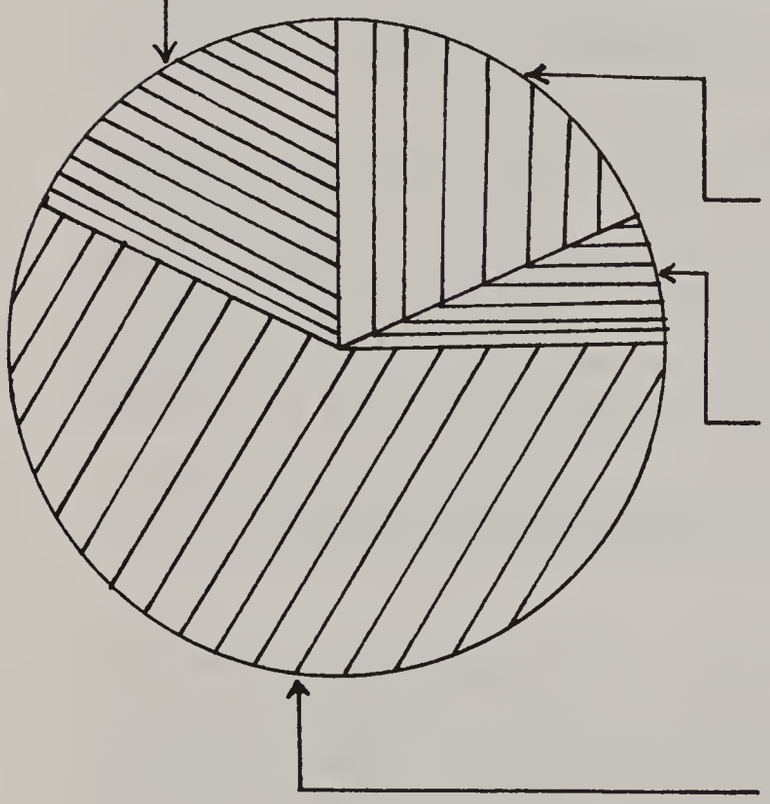


TABLE III-13

Lands Capable, Available, and Suitable for Timber Production

Criterion	Classification	Acres
	National Forest System	1,867,782
	Water	2,252
Minimum Biological Growth Standard (20 Cubic Feet/ Acre/Year)	Non-Forest Land	518,968
	Forest Land	
	A. Not Capable (Less than 20 Cubic Feet/Acre/Year)	227,556
	B. Capable but not Available	
	1. Reserved	
	Wilderness	157,380
Legislatively or Administratively Withdrawn	Research Natural Areas	823
	2. Deferred	
	Wilderness Study Areas	
	-designated by Congress	63,162
	-designated by Administration	0
	Special Areas (Chimney Rock)	1,233
	Wild and Scenic Rivers	9,023
	C. Capable and Available but not suitable	
Lack of Technology or	1. Technologically Not Suitable	
	Irreversible Soil or Watershed Damage	0
	Five Year Regeneration	85,911
Administrative Allocation	2. Administratively Not Suitable	
	Experimental Forest	0
	Administrative Sites	0
	D. Capable, Available and Tentatively Suitable Land	801,474

This recent decline in timber harvest and mill demand has been attributed to increased costs (mainly road access and logging), depressed markets, and smaller diameter trees.

Table III-14 shows the estimated annual sawtimber needs for sawmills dependent on the San Juan National Forest area to be approximately 30 to 42 million board feet. This is based on present estimated mill capacities, past purchases, and stated needs of sawmills that rely on San Juan National Forest timber.

TABLE III-14

Indicated Annual Sawtimber Needs from the San Juan National Forest

Mill Location	Volume (Million Board Feet)
Durango	10.0
Bayfield, Ignacio	.5
Pagosa	*3.0
Chama	5.0
South Fork	5.0
Mancos	3.0
Dolores-Cortez	16.0
Total	42.5

*Does not include the San Juan Lumber Company mill capacity.

Since 1960, Engelmann spruce, true fir and Douglas-fir have been the major species harvested on the Forest, accounting for 62 percent of the harvest, followed by ponderosa pine at 28 percent and aspen at 10 percent.

The timber resource is being regulated on a non-declining yield basis. This means that the yield of wood fiber for any decade will not be less than the yield of the previous decade. This also implies that the average annual amount cut cannot exceed the long-term capability of the Forest to regenerate wood fiber on a sustained yield basis. Current average annual cut is below that level and is aimed at supporting local dependent industries.

Commercial harvest techniques have generally been limited to tractor logging, primarily because the low volume cut per entry on most sales has rendered high cost logging systems economically infeasible. Tractor logging is limited to slopes of less than 40 percent.

Timber harvests are designed to achieve multiple use objectives, including water yield, range and wildlife habitat improvement, fuel reduction, insect and disease control. Regeneration systems called for in the 1976 Timber Management Plan include clearcut and shelterwood in the spruce-fir and Douglas fir types and clearcutting in the ponderosa pine and aspen types. Not all of these regeneration systems are scheduled in the first Plan period; however, they are scheduled in later periods when the stands are to be regenerated.

From about 1970 to the present, the shelterwood system has been applied in the spruce-fir type. Some stands have received a preparatory cut, however, the seed cut in these stands has not been made. Based on the history of harvesting stands by partial cutting prior to 1948, it is anticipated that these stands will regenerate naturally following the seed cut.

From 1962 to 1980, 40,568 acres have been planted. Some acres have also been replanted. A summary of past planting records is shown below:

Species	Acres Planted	Acres Regenerated	Percent Regenerated*
Ponderosa pine	16,677	1,879	11
**Engelmann spruce	23,891	5,419	23
Totals	40,568	7,298	18

*Based on minimum of 300 trees/acre.
**Some acres of lodgepole pine included in these results.

As a result of the poor regeneration success, ponderosa pine sites which are presently non-stocked (an existing condition of less than 40 square feet of basal area per acre or equivalent stocking) or on greater than 30 percent slope, are considered unsuitable for timber production (See Appendix L). For Engelmann spruce, harvest methods were changed from clearcutting as the predominant method, to shelterwood to enhance natural regeneration except that small clearcuts using aerial logging systems are permitted.

Demand Trends - Some assumptions regarding the future of timber production on the San Juan National Forest are as follows:

-It is anticipated that demand for the timber resource will increase at a moderate rate, except for fuelwood demand which will be high.

-There will be a strong demand from outside the local area for the Forest to contribute to the national wood supply.

-It is anticipated that market and non-market demands from the Forest will increase and that in some cases the demands will be in conflict.

WATER

The San Juan National Forest generates slightly over 15 percent of the flow of the Colorado River measured at Lee's Ferry, Arizona although it occupies only about three percent of the drainage area. Nearly 80 percent of the San Juan River at Bluff, Utah originates on the Forest which accounts for only eight percent of the total basin. Average annual yield from gross Forest acres is about 2.5 million acre-feet. These statistics illustrate the importance of San Juan National Forest water not only for on-Forest wildlife, fisheries, and recreational uses, but also externally for municipal, industrial, irrigation, recreational, and instream uses.

Current Use and Management - Current Forest Service management concerning water rights, instream flows, municipal watersheds, special uses, and large development projects is still affected by the historic uses of the resource for mining, irrigation, and hydro-electric power generation. The San Juan National Forest provides water for 18 irrigation reservoirs within or adjacent to its boundaries.

Water developments on the San Juan National Forest include campground and picnic ground development, other developed recreation uses, range management uses and for domestic use at Ranger and guard stations. At the present time, annual Forest water uses total 4,445 acre-feet. Many of the streams on the Forest are impacted by diversions and are drying up. Several streams need instream flow quantification and water rights procurement.

The annual water yields from the San Juan National Forest can be increased depending on the extent and location of vegetation treatment and snow management activities. Constraint of water quality management standards limits yield. An increase of about 90,000 acre-feet could be provided from the Forest on an average annual basis without degrading water quality.

Snow management structures and vegetation manipulation are often feasible means of increasing stream flow. Cloud seeding with silver iodide crystals in the San Juan Mountains as a method of augmenting snowpacks and water yield is again being studied by the Bureau of Reclamation. A permit has been issued to the Bureau of Reclamation for electronic monitoring of limited cloudseeding being performed by private consultants in cooperation with various local water and snow users. Changes

in stream flow timing can be obtained through reservoir construction and control of peak flows through vegetation treatment. As more funds become available, additional snow fencing can be utilized to provide increased stream flow from the high elevation watersheds. Existing yield increases, about one percent of current total water yield, have resulted from timber management activities and other vegetation reducing activities, such as roads, powerlines, pipelines, and fires.

Water yield increase potential in the five-county area is confined primarily to the spruce-fir, aspen, and alpine zones, most of which occurs on the San Juan National Forest.

Numerous water collection, storage, and distribution systems exist within the Forest boundaries. Requests for further water development are processed according to Colorado State water laws and the Forest Service special use permit process.

Riparian areas within the Forest were identified based on stream type classification used in the Forest Plan inventory and are on file in the planning records. Currently, individual projects occurring in these riparian zones incorporate specific protection and management measures.

The riparian and aquatic zones identified in the stream type classification process are the flood-prone areas of the Forest covered by Executive Order 11988, Flood Plain Management. New development or other concentration of activities is limited to areas where impacts on floodplain/wetland resource values can be mitigated.

Water quality on the Forest is generally good, although some problems occur from mining activities, road construction, timber harvesting, and grazing.

Demand Trends - The following are some assumptions that can be made concerning the future of the water resource on the San Juan National Forest:

-The importance of the water resource will increase greatly in future years.

-Mineral related activities will an have increasingly important impact on water quality and watershed restoration. Future inventories will require more intensive baseline data in acidity, heavy metals, suspended sediment and other water chemistry parameters.

-Water right conflicts between Forest Service and private sector continue to increase as more applications for water rights for Forest water occur, instream flow needs are quantified, and the State of Colorado, Division #7, water rights adjudication becomes active.

MINERALS AND GEOLOGY

The geologic forces that created the topography of the San Juan National Forest also led to a high degree of mineralization in the area. As a result, mineral resource use is a significant activity both on and off the Forest.

Mineral resource management centers around three categories of minerals: locatable, leasable, and salable. Ores containing locatable minerals occur on the Forest in two general geologic environments: volcanic-intrusive complexes, primarily in the Colorado Mineral Belt, and sedimentary deposits of the Colorado Plateau sandstone-uranium trend. Approximately one-half of the San Juan National Forest is estimated to have high to medium potential for leasable minerals. There are no historical records on the development and use of common variety salable minerals such as sand, gravel, and building stone.

Locatable Minerals

Current Use and Management - Approximately one-third of the San Juan National Forest can be classified as having high to medium potential for valuable deposits of locatable minerals. Production of locatable minerals has historically been concentrated within five mining districts on the Forest: La Plata, Rico, Needle Mountains, Mt. Wilson-Trout Lake, and Eureka. Placer and lode gold, along with silver, copper, lead and zinc have been recovered from these districts since the 1870's. More recently, uranium has also been extracted from sites on the Forest, and exploration for molybdenum has been carried out.

Other locatable minerals that have the potential of being economically developed on the Forest include tungsten, thorium, uranium, and vanadium. Occurrences of tungsten are limited to the Silverton-Wilson Mountains-Trout Lake area. Mineable thorium occurs in one locality in the Bridal Veil Creek area, just north of the San Juan National Forest boundary. Uranium occurs sporadically across the central and western thirds of the Forest. Vanadium generally occurs with uranium in Jurassic sandstones.

Outcrops of potentially locatable Leadville Limestone occur in the drainage areas of the Animas, upper Florida and Piedra Rivers, and Vallecito Creek above the Reservoir. Minor amounts of iron, manganese, nickel, cadmium, mercury and sulfur have been produced from various areas of the Forest.

Demand Trends - Exploration, development, and production of locatable minerals will continue to increase in the 1980's. The outlook for increased exploration and development of precious and base-metal ores is mixed. Recent price fluctuations in gold and silver markets have led to slightly decreased interest, but generally rising prices will spur new interest in known deposits and further exploration activity. Of the base metals, only zinc has a good outlook for the immediate future; decreasing use in the auto industry, which has depressed the market, will possibly be offset by the introduction of a zinc U.S. penny coin. Large surpluses of copper make possible recovery for the copper market a long-term business. Demand for lead will increase slowly, with use in electric-car batteries a possible long-term strengthening effect. Increasing political pressure to develop domestic resources may spur development of economically marginal operations.

The long-range outlook for exploration and development of molybdenum resources is good. Demand decreased somewhat during 1980, but increasing use of molybdenum is projected in new higher-efficiency, lighter aircraft and water vehicles, and wider use of the metal in other products is anticipated.

The outlook for tungsten development is less favorable, due to plans by the U.S. Government to dispose of large surplus stockpiles of the metal in the near future. Increasing production world-wide will also depress the outlook for future exploration on the Forest.

Increasing use of coal to generate electrical power in the Four Corners Region may lead to further evaluation and eventual development of the Forest's limestone resources as an emission-scrubbing agent.

The outlook for development of uranium resources is dampened by the continuing depression in the industry. Very slow recovery is likely, but competition with Canada and Australia may hurt domestic development and exploration activity.

The outlook for vanadium demand is good as vanadium is a cheaper substitute for molybdenum as a steel-hardening agent. U.S. plans to acquire a strategic stockpile of this metal should spur exploration and development.

Leasable Minerals

Current Use and Management - Historic production of leasable minerals on the Forest was initiated by the discovery of coal seams on the surface, which provided an easily available energy source. Mining of coal occurred in the southern portions of the Pine and Pagosa Districts and near Hesperus and Durango south of the present San Juan National Forest boundary.

Since 1920, approximately 80 exploratory oil and gas wells have been drilled on the Forest, most of which were either dry or had amounts of oil or gas too low to be economically extracted. Several proven reserve fields lie along the southern and southwestern boundaries of the San Juan National Forest. Currently wildcat drilling programs are in progress along the southern portions of the Pine and Pagosa Districts and the western part of the Dolores District. Five producible natural gas wells on the Pine and Dolores Districts were discovered in 1981-82 and production is expected subsequent to the construction of gathering pipelines. Virtually the entire western third and southeastern third of the Forest are covered with existing oil and gas leases or lease applications.

The United States Geological Survey has inventoried four areas as being prospectively valuable for geothermal resources:

-West Fork area	-- 26,300 acres
-Pagosa Springs area	-- 26,300 acres
-Dunton-Rico area	-- 132,109 acres
-Trimble-Pinkerton area	-- 130,313 acres

To date no geothermal leases have been issued. Interest in developing this resource is limited by the generally low temperature gradient of the geothermal waters.

Oil companies are planning a joint CO_2 project which includes the Doe Canyon area on the western edge of the Forest. The corridor for a 480-mile transmission pipeline to Texas has been approved, and construction should commence when the necessary permits are issued. Interest in CO_2 has been expressed by other companies and several new exploratory wells are planned to test for CO_2 east of the present project field.

Two areas of the Durango Known Recoverable Coal Resource Area (KRCRA) lie on the San Juan National Forest. A detailed assessment is in Appendix I.

Of the designated wildernesses, only the Lizard Head Wilderness has medium to high known potential for the occurrence of oil and natural gas. The eastern portion of the Weminuche Wilderness contains part of the West Fork geothermal resource area. The known potential for other leasable minerals within the designated wildernesses is low.

Demand Trends - Exploration and development of leasable minerals, especially fossil fuels, is expected to increase sharply over the coming years. The southern portions of the Pine and Pagosa Districts and the western part of the Dolores District will probably bear the major impacts of this activity.

Any development of geothermal resources on the San Juan National Forest will be limited to small-scale uses such as space heating and spas; activity should be of minimal impact within the geothermal resource areas.

Exploration activities for oil and gas will increase both in frequency and in the number of areas affected. Technological advances in geophysical interpretation and data-gathering methods will result in more activity and heavier impacts in favorable areas.

Wildcat and development drilling for oil and natural gas will become more frequent on the San Juan National Forest as prices for these commodities increase.

Attendant facilities such as roads, pipelines, and electric power transmission lines will be necessary as wells are brought into production. Both existing and new corridors for pipelines will need to be evaluated.

Development of the present CO_2 project will continue through the 1980's and other companies will likely join in the search for CO_2 in the western part of the Dolores District. Further associated demand for pipeline and other facilities can be anticipated.

Applications for coal leases and attendant development are anticipated on the southern portions of the Pine and Pagosa Districts. Areas determined to be suitable for coal development under the Coal Unsuitability Criteria will require site-specific study prior to leasing and mining activity.

Salable Minerals

Current Use and Management - Seventy-six aggregate sources of salable minerals have been inventoried, the majority of which have not been developed. Those developments that have taken place are short-term and site specific, mostly for Forest, County, and State road projects. A small number of non-competitive sales for lichen-covered ("moss") rock have been made over the past few years.

The Forest Service has issued Special Use Permits to Dolores County and the Colorado Highway Department for gravel and borrow pits. The Bureau of Reclamation has a permit to remove riprap at Barlow Creek for the construction of the McPhee Dam on the Dolores River.

Demand Trends - The outlook for salable minerals on the San Juan National Forest is for an increase in applications for sand, gravel and building stone corresponding to increases in the number of construction, mining, and housing projects in the 1980's.

HUMAN AND COMMUNITY DEVELOPMENT

The San Juan National Forest is committed to a Nation-wide program of human and community development, which has as its primary objective helping people and communities to help themselves. The program includes activities that provide work and learning experiences for youth, adult employment, training opportunities, and technical assistance to individuals and communities.

Current Use and Management - The Forest has been actively engaged in a wide variety of manpower and youth training programs. A summary of the major programs is as follows:

> Comprehensive Employment Training Act (CETA) Program. The San Juan National Forest has long participated in this program, which provides employment to youths between the ages of 15 and 18. The average annual participation has been 8 CETA enrollees, nearly all of whom are women or minorities.
>
> College Work-Study Program. This program is designed to provide work experience and employment to low income college students. The Forest has cooperated with several colleges and universities over the past several years in employing students. There has been a high of about 15 students several years ago to a low of one or two students at this time. Many of these students are women and minorities. College funding for this program has diminished considerably in recent years.

Volunteers in National Forest Program. This program authorized in 1972, has been used extensively to accomplish campground host work and archaeological surveys. In 1980, there were 36 volunteers working for the Forest.

Senior Community Service Employment Program (SCSEP). The Forest Service has been an active participant in this program, and its predecessor, Operation Mainstream, for many years. There are currently 18 enrollees, 55 years of age or older who meet low income requirements specified by the Department of Labor. Many of these individuals are women and minorities. The San Juan National Forest SCSEP is the largest program in the Rocky Mountain Region of the Forest Service.

Inter-governmental Personnel Act Program. This program was designed to allow Federal agencies to exchange employees with State and local governments and institutions and has been utilized to accomplish needed scientific research on the San Juan National Forest.

Faculty Program. This is an employment program which allows Federal agencies to employ faculty members from colleges and universities. In 1979 and 1980, two individuals were employed, and in 1981 one person was employed in the program.

Demand Trends - The outlook for manpower and youth training programs on the San Juan National Forest is not encouraging. Many of the programs are Federally funded, with monies coming from other government agencies. The current economic and administrative climate in the country is such that monies have been, and will likely continue to be, significantly reduced.

The Young Adult Conservation Corps (YACC) Program was phased out on the San Juan National Forest at the end of Fiscal Year 1981. The Youth Conservation Corps (YCC) Program was phased out early in Fiscal Year 1981. The SCSEP has not been reduced although indications are that the Forest's share of program monies may be curtailed. SCSEP program monies from the Forest would be shifted to Forests near population centers. Volunteer programs will likely increase, limited only by the number of willing participants.

SUPPORT ELEMENTS

LANDS

Special Land Uses

Except where special uses are specifically prohibited through legislation, local zoning or administrative decisions, the San Juan National Forest may be available for occupancy if it is in the public interest and compatible with Forest Service goals and objectives. Occupancy is authorized through the issuance of special land use documents. Factors that limit authorization of occupancies are availability and suitability of land for the proposed uses and compatability with other National Forest management purposes.

Current Use and Management - Special land use applications are increasing as more people make use of the San Juan National Forest. For example; 88 non-recreational documents were issued prior to 1960; 183 documents issued from 1960 to 1969; and 205 documents from 1970 to 1980. There are also 133 recreation-related special use permits of various types such as ski areas, packer-outfitter-guide permits and summer home permits.

Special land uses with significant impacts on the Forest include corridors for oil and gas transmission pipelines, 29.7 miles; electric power transmission and distribution lines, 165.1 miles; water transmission lines and ditches, 104.3 miles; and telephone lines of 117 miles.

Demand Trends - A general assumption is that demands on the San Juan National Forest for the various special uses will increase substantially in future years. Issuance of special use occupancy documents will become more difficult due to increasing conflicts with Forest management activities.

Land Ownership

The San Juan National Forest was established in 1905. Included within the National Forest boundary are private lands, mineral fractions, and lands administered by other government agencies. The Forest Service acquires land through land exchanges, purchase, and the use of scenic easements.

Land exchange and purchase have been moderate. Land and Water Conservation Funds (L&WCF) have been used to purchase a number of private lands that were primarily valuable for outdoor recreation purposes. This program has been the only source of funding for land purchase.

Occupancy trespass involves the identification, investigation, and resolution of non-mineral related unauthorized occupancy and use of the San Juan National Forest. There are many suspected non-mineral related occupancy trespasses resulting from tracts of private land where owners have constructed improvements on adjacent National Forest System land. Where property lines are not well identified, the Forest Service has increased efforts to establish property lines through accurate boundary surveys. It is anticipated that ongoing surveys of township and property boundaries will identify more unauthorized occupancy.

There is also an increasing amount of development, especially subdivisions, adjacent to National Forest System lands. The associated impacts in Forest management are increasing; for example, conflicts over responsibility for range fences along property boundaries; access to the Forest; and loss of key winter habitat for wildlife.

Current Use and Management - Generally, the Forest Service may dispose of National Forest System lands only through exchange. Owners of adjacent property generally favor land exchanges with the Forest Service to reduce subdivision costs, resolve access difficulties, and realize investment benefits. Exchange activity has been low in the past due to uncertain funding and few proposed exchanges which would benefit the public.

Land ownership adjustments are coordinated with the plans and programs of other Federal agencies, and State and local governments. The San Juan National Forest and the Bureau of Land Management (BLM) have proposed a major boundary adjustment which is now awaiting Congressional approval. This adjustment was initiated in 1975 and encompasses 31,607 acres of National Forest System land and 25,559 acres of BLM land. There are three Wilderness Study Areas involved in the boundary adjustment. If the study areas are transferred to the Forest Service, the studies will be continued by the Forest Service and a recommendation of suitability or unsuitability for wilderness will be made to Congress.

Demand Trends - Land ownership adjustment proposals from private and government agencies are expected to increase in the immediate future.

Rights-of-Way

The intermingled public and private lands within the boundary of the San Juan National Forest have resulted in many access problems. These problems are becoming more critical as demands for the use of public land increase. Many acres are unavailable for public use because of insufficient access. More access to the Forest for the general public is a major public issue, because adjacent landowners often enjoy nearly exclusive use of public land through control of access.

Current Use and Management - The San Juan National Forest presently acquires about five to six rights-of-way (ROW) annually. The current emphasis is to acquire ROW's where access problems are the greatest. Private landowners are reluctant to grant ROW's to the Forest Service unless there is a significant benefit to the landowner. When a ROW is in the public interest and the property owner is unwilling to grant an easement, the right of eminent domain can be used.

The status of existing ROW's on roads and trails is often uncertain. The public often mistakes unfenced private lands for public land which results in trespass onto private lands. This action often prompts the private landowner to challenge the validity of the easement.

Demand Trends - The demand for public ROW access will increase as San Juan National Forest uses increase. Resistance to grant public ROW's is also likely to increase.

Withdrawals

A withdrawal is an order removing specific land from availability for certain uses. Certain lands administered by the Forest Service may be withdrawn from entry and appropriation under various acts of Congress.

Current Use and Management - Land withdrawals on the San Juan National Forest are composed of: Federal Energy Regulatory Commission withdrawals for transmission rights-of-way, Bureau of Reclamation withdrawals, and Congressional withdrawals for certain activities within wilderness areas and proposed Wild and Scenic Rivers. These withdrawals comprise 463,315 acres on the Forest.

A review and assessment of existing withdrawals is required by Section 204 of the Federal Land Management and Policy Act. Present direction to all agencies is to review withdrawals by 1991, and revoke those which create an unnecessary encumbrance on the land. A summary of proposed mineral withdrawals and revocations can be found in Appendix E of the Forest Plan.

Demand Trends - The only new withdrawals contemplated are withdrawals for administrative sites, Natural Research and archaeological areas, and those involving other major investment areas which require protection.

Licenses and Permits

This section covers licenses and permits issued by another Federal agency for surface use of National Forest lands. The San Juan National Forest has lands withdrawn under the authority of the Federal Power Commission for existing and proposed hydroelectric projects.

Current Use and Management - Currently there are two projects on the San Juan National Forest that have either a license or a preliminary permit for a proposed project. These permits were issued by the Federal Energy Regulatory Commission.

-Colorado-Ute Electric Association - Tacoma-Ames Project No. 400 - License.

-Ptarmigan Resources and Energy Inc. - Lemon Reservoir Project No. 2938 - Preliminary permit.

The Tacoma-Ames license was issued March 19, 1936. The project has been active for several years developing hydroelectric power. A major expansion of the facility was made in 1980-1981 and there is currently a request for renewal of the license with the Federal Energy Regulatory Commission.

The Lemon Reservoir project was issued a preliminary permit that will expire in 1982. It is not known at this time if the proponent expects to file application after 1982.

Demand Trends - Except for the recent expansion of the Tacoma-Ames project there are no other definite development proposals at the present time. However, with the interest in and the associated rising costs of energy development, it is safe to assume there will be additional studies, particularly in line with water impoundment projects. An example of this is the recent study of the McPhee pumpback storage project near Hoppe Point on the Dolores Ranger District. Although in the preliminary stages, the project appears feasible and, if so, would require a license under the authority of the Federal Energy Regulatory Commission.

Utility and Communication Facilities

Current Use and Management - Utility and communication facilities on the Forest are authorized by special use permit or easement. They include oil and gas pipelines, powerlines, telephone and telegraph lines, electronic sites, and a railroad easement. The locations of the major existing utility uses as well as corridors within which future major uses will be considered are shown on the Forest Plan map.

Demand Trends - It is expected that the present trend of increasing numbers of utility uses will continue through the next five decades.

Special Areas

Special areas are designated portions of the San Juan National Forest for specific purposes such as research natural areas, wild and scenic rivers and archaeological areas.

RESEARCH NATURAL AREAS - The San Juan National Forest has one designated research natural area, Narraguinnep; and two potential areas, Williams Creek and Spring Creek.

Current Use and Management - Narraguinnep Research Natural Area is representative of the mesa country of southwestern Colorado. Located on the Dolores Ranger District, the vegetation consists of ponderosa pine, pinon pine, juniper and oakbrush types. Due to topography, virgin conditions prevail. Livestock is excluded through the use of fences and natural barriers.

Narraguinnep was originally designated as a 4,079 acre natural area by the Chief of the Forest Service on July 3, 1931. It was reclassified on May 15, 1962, to a research natural area of 1,928 acres. It is withdrawn from mineral entry.

Williams Creek Area is a potential research natural area of approximately 420 acres of white-fir forest on the Pagosa District and appears to be suitable for designation as a research natural area.

Spring Creek Archaeological District is a potential research natural area for the study of prehistoric, aboriginal ecosystems. It is an area of 3,360 acres which has been nominated for listing in the National Register of Historic Places.

Demand Trends - Future demands for natural research areas should remain at current levels, or slightly increase. The existing site and proposed site should be adequate for the next 10 years.

WILD AND SCENIC RIVERS - The 1975 Wild and Scenic Rivers Act designated three rivers on the San Juan National Forest for potential addition to the National Wild and Scenic Rivers System. The three rivers are the Dolores River, the Piedra River, and the Los Pinos River.

Current Use and Management - The Forest has completed Wild and Scenic Rivers Study Reports and Environmental Impact Statements on all three rivers. The Dolores River Study has been submitted to Congress for action. The Los Pinos River Study and the Piedra River Study are presently undergoing review by the Administration at the National level.

All of these studies were completed with the cooperation of the State of Colorado. For the Dolores River, the consensus recommendation of the Forest Service and the State of Colorado was that 105 miles be designated as a component of the National System of Wild and Scenic Rivers with a classification of 33 miles as "Wild," 41 miles as "Scenic," and 31 miles as "Recreational." In addition, the Colorado Department of Natural Resources determined that the 35-mile West Dolores River be considered eligible for a Recreational River classification. For the Los Pinos River, approximately 54 miles meet criteria for possible inclusion as a component of the National System with a Wild River classification.

For the Piedra River, the determination is that approximately 50.9 miles meet criteria for possible inclusion in the National System with a classification of 32.5 miles as "Wild," 12.9 miles as "Scenic," and 5.5 miles as "Recreational."

The San Juan National Forest was also directed to make evaluations of the San Juan River and Animas River for possible inclusion in the National System of Wild and Scenic Rivers. Neither river was determined to be eligible. See Appendix H - Determination of Animas and San Juan Rivers for Wild and Scenic Rivers Eligibility.

Demand Trends - The demand to protect and maintain free flowing rivers will increase.

CHIMNEY ROCK ARCHAEOLOGICAL AREA - Chimney Rock Mesa, located off Colorado Highway 151 twenty miles southwest of Pagosa Springs, lies between the Piedra River to the west and Stollsteimer Creek to the east. Chimney Rock features a heavy concentration of Anasazi ruins.

Current Use and Management - In 1970, Chimney Rock Archaeological Area, a 3,160 acre parcel, was designated under Secretary of Agriculture Regulation U-3 and entered in the National Register of Historic Places.

Various management plans have been proposed for the Chimney Rock Archaeological Area. Some of these proposals provided for significant development along Highway 151 at the base of the mesa, including a parking lot, visitor information center, and picnic facilities. Consideration has also been given to joint development with the Southern Ute Tribe which would include the nearby Ute owned Capote Lake area. The Southern Ute Tribe owns land in and around the Chimney Rock area and would like to participate in and benefit from the development of Chimney Rock as a tourist-oriented area.

The development of the Chimney Rock site was stopped in part due to the presence of a pair of peregrine falcons, an endangered species.

Today, Chimney Rock Archaeological Area is accessible by a dirt road from Highway 151. The road is closed to the general public. During the summer, the Forest Service conducts guided tours of the ruins. The tours are organized by the Forest Service and the Pagosa Springs Chamber of Commerce.

Demand Trends - The demand for public access to the Chimney Rock Archaeological Area will increase. The Southern Ute Tribe has indicated a continuing interest in possible development of the archaeological area.

SOILS

The soils within the San Juan National Forest vary considerably depending on landform, geology and the erosional and depositional processes. The soils are forming in sandstones, shales, metamorphic and igneous rocks, as well as glacial and alluvial deposits. The landforms include mesas, cuestas, canyons, glaciated mountains, alpine features and some alluvial terraces.

Current Use and Management - The objective of soil management on the Forest is to match management activities to the capability and suitability of the soil to assure long-term productivity. This can be done quite precisely where the soil has been inventoried and soil characteristics are known. Through cooperation with the Soil Conservation Service and participation in the national cooperative soil survey, there are 1,033,195 acres on the San Juan National Forest that have been inventoried with a soil survey. On uninventoried areas, the land productivity will have to be estimated and the maintenance of soil productivity only assumed.

Accelerated soil erosion could decrease soil productivity. However, most prudent and well managed forest and range activities can be designed to contain soil erosion within tolerance limits.

Soil compaction due to heavy equipment use on moist, fine textured soils can also affect soil productivity. Management activities such as skidding logs, hauling logs, and construction are conducted when these soils can support the heavy loads of the activity.

Soil management services are provided to those projects judged to have potential for soil resource damage. These projects include timber sales, road locations, mineral operating plans and range management plans. Management services typically include recommendations to reduce the impact such projects have on the soil.

Demand Trends - Continuing concern by the public to maintain the productivity of soil will require increased management emphasis on maintaining soil productivity.

FACILITIES

Structures and Administrative Sites

Current Use and Management - The Forest Service currently owns five office buildings, 18 dwellings, four lookout towers, 14 work centers, and 30 other miscellaneous buildings, for a total of 71 buildings utilized in direct management of the San Juan National Forest.

New office space is generally acquired through General Services Administration (GSA) leases. The Supervisor's Office and the Animas Ranger District Office are housed in a GSA-leased building in Durango. The Dolores Ranger District Office, although not under a GSA contract, is also leased. Construction is limited to warehouses and special project buildings. Current plans call for a new warehouse in Dolores. Use of government furnished housing by Forest Service employees is increasing.

Most of the office and work facilities on the Forest are over 40 years old. The facilities are used to capacity and, in some instances, are overcrowded. Many are not fuel-efficient, either in location or design. Most of the buildings need to be retrofitted for energy efficiency.

There are no solid waste disposal sites on the Forest.

There are 65 road bridges or major culverts on the San Juan National Forest, representing a $4,000,000 capital investment. There are also 34 trail bridges, which cost approximately $850,000 to construct. The first bridges were built in the early 1900's and the most recent is the Bradfield Bridge, which was built in 1980.

There are over 300 dams on the Forest, but only 13 of these are over 20 feet in height. Only one of these 13, the dam at Henderson Lake, is owned and maintained by the Forest Service. There are currently no plans for construction of additional dams over 20 feet in height.

Demand Trends - There will be a continuing demand for reconstruction of existing buildings and recreation sites due to their age and condition. Further bridge work will involve rebuilding and upgrading of existing structures. There are proposals for additional dams to be constructed on the Forest and as water demands increase, additional storage capacity will be proposed.

The demand for solid waste disposal sites on the Forest will increase as population and land values increase.

Transportation

The San Juan National Forest has 2,218 miles of inventoried Forest development roads. Arterial and collector roads consist of 738 miles and the remainder are classified as local roads. Other Federal, State and County roads also provide access to the Forest. In addition to these roads, a significant number of primitive roads have been created by off-road vehicle (ORV) use. (Trails are discussed under recreation.)

Current Use and Management - About 1,050 miles of road are maintained annually. Current management direction is to provide the minimum road facilities and maintenance needed to safely accommodate the expected type and volume of traffic. State and County governments are encouraged to take over those roads that serve private developments. Counties and the State Highway Department are also facing funding constraints and are reluctant to add to their maintenance load.

Much of the road system now requires, or will soon require, reconstruction to provide safe and maintainable standards. Some roads causing erosion problems or which cause undesirable impacts due to human use on other resource uses, such as recreational activities or wildlife, have been obliterated (returned to production) or put-to-bed (stabilized). More roads are scheduled for such action.

The road system is managed through specific management objectives and traffic regulations. Management of one road may consist of closing the road to public use year around. Currently, approximately 40 percent of the road mileage is maintained only to a standard necessary to protect the road investment and the surrounding resources. Reasons for this level of travel management include economics and undesirable impacts of human use on resource uses such as recreational activities and wildlife. Seasonal closures are also necessary on other roads to prevent resource damage or damage to the roadbed.

Areas where indiscriminate off-road driving results in erosion or aesthetic problems and areas where traffic is legally prohibited are closed to off-road vehicle use. Areas where ORV use has not demonstrated a resource or user conflict are open to vehicular traffic and ORV use. The present travel management status is displayed on the San Juan National Forest travel map.

Demand Trends - The demand for use of Forest roads is significant. Several roads are now heavily used and any increase in traffic volume would cause congestion and safety problems. Four-wheel drive interests want more opportunities for off-road and primitive-road use. The owners of private inholdings want exclusive access to their property. Sight-seers want more roads with better driving surfaces. Although there is demand for numerous and varied road opportunities, some non-motorized recreationists want fewer roads.

New recreation attractions or resource management areas will require new roads and the upgrading of existing roads. Future increases in Forest road use will depend on population growth and fuel prices.

PROTECTION

Fire

The fire management program in the San Juan Basin of southwestern Colorado is a coordinated interagency effort, involving Federal, State and local agencies. It is the overall fire management objective to provide a cost-effective program which responds to land and resource management goals and objectives. This includes fire protection and use.

Current Use and Management - Since 1978, there have been two separate fire suppression objectives for the San Juan National Forest, within the overall objective. The first, applied on all but 305,000 acres of the Forest is to control all fires at ten acres or less. The second, applied on the remaining 305,000 acres of the Forest, includes variable acreage control objectives, depending upon the area involved and fire intensity. Other fire management objectives for the entire Forest are to protect air quality through the management of wildfires and prescribed fires, and to use prescribed fire to reduce fuel hazards and accomplish resource management objectives.

Fire has had an important influence on many of the ecosystems on the San Juan National Forest. This is obvious from the fire scars on mature trees, the presence of burned snags, existing vegetation mosaics, and from accounts of Native Americans and early settlers in the area.

The average number of wildfires varies considerably with weather conditions. In the past 20 years, the number of man-caused fires has decreased slightly, while lightning fires have increased.

Demand Trends - Some increase in the number of man-caused fires can be expected as development and visitor use increases, although this will not drastically affect the wildfire situation.

The average annual burned acreage has not significantly changed over the past two decades. From 1961 to 1970, an average of 109 acres were burned per year, whereas from 1971 to 1980, an average of 112 acres were burned per year. This is an insignificant acreage loss on a National Forest of this size, particularly when considering the low intensity of the fires that burn most of the acreage.

The potential for large destructive fires does exist on the San Juan National Forest. Over the next 40 to 100 years, due to aging and decay of forested areas, the fuel hazard will likely increase and could result in larger, more destructive fires. This is particularly true in areas of the Forest which receive little fuel treatment.

Integrated Pest Management (IPM)

Current Use and Management - The Forest's objective is to ensure optimal pest management with respect to environmental concerns, biological effectiveness, and economic efficiency while achieving resource management objectives. The intention is to rely on an IPM policy which will reduce the reliance on chemical methods, and manage resources in a manner that is not conducive to the development and perpetuation of pest problems. Pesticides will be used under prescribed conditions to protect resource values when their use is prudent and control of potential adverse effects can be minimized. Pests significant enough in population to warrant mention are insects (mountain pine beetle, spruce bark beetle, western spruce budworm, western tent caterpillar); noxious weeds (Canada thistle, toadflax, whitetop, knapweed, spurge) and rodents (mice, gophers, porcupines).

Only the western tent caterpillar is epidemic; that is, spreading rapidly. It has infested about 20,000 acres of aspen trees on the Pagosa District at the southeast end of the San Juan National Forest.

Ponderosa pine stands near Dolores, Colorado, are infested with mountain pine beetle. Populations are endemic now, but are increasing and threaten to become epidemic.

The western spruce budworm is endemic in Douglas-fir and white fir stands with quite intensive infestations in local areas. Areas around Vallecito and Lemon Reservoir are of particular concern.

Spruce bark beetle is endemic, but has been a problem in the past, particularly around the edges of timber clearcut units.

Infestations of noxious farm weeds are scattered throughout the San Juan National Forest where human activities have provided the opportunity for their introduction.

Rodents are causing damage to Forest plantations and livestock range in localized areas, but are not considered to be out of control.

Demand Trends - At present, pest control in forest stands is managed to meet long-range objectives through prevention measures using cultural vegetation practices, particularly planting, harvesting and utilization practices. Biological, chemical, mechanical means, and prescribed fire are considered for epidemic conditions. Only western tent caterpillar, western pine beetle and noxious weeds are considered to be increasing in population at a rate that would be a threat to resources and uses.

Noxious farm weeds are controlled by chemical means, usually in cooperation with counties. The current level of control is below what is required to meet needs identified in noxious weed inventories.

Air Quality

Current Use and Management - Air quality over the San Juan National Forest is good with respect to all air pollutants. The largest source of air pollution from Forest activities is smoke from both wildfires and prescribed fires and dust from unpaved roads.

The Clean Air Act and its 1977 amendments give the States most of the responsibility for managing air quality within their boundaries. The framework for air quality management is the State's implementation plan.

The Forest Service role in air quality management is coordination of San Juan National Forest activities with State and Federal air quality control efforts. This is accomplished by properly managing the air pollution created by Forest Service activities such as prescribed fire, construction and use of roads, and the operation of various facilities. It also includes review of ski area permit applications for potential air quality impacts from fireplace smoke and automobile exhaust. The

Forest Service has a primary responsibility for protecting the Forest from adverse impacts created by external sources of air pollution, such as industrial plants and automobiles, by coordinating with the Environmental Protection Agency and the State of Colorado.

The Forest Service manages air quality in wilderness areas to prevent adverse impacts on wilderness values. Such management includes reviews and recommendations on new source emitting facilities to ensure compliance with the Federal and State permit programs.

The Forest Service complies with the agricultural burning application and permit requirements of the Air Pollution Control Division, Colorado Department of Health.

EXPENDITURES AND RETURNS

The fiscal year 1980 budget for the San Juan National Forest was $11.05 million ($9.03 million in 1978 dollars), including capital investments. The following tabulation shows a general breakdown of budgeted items:

Budget Item	1980 Dollars	1978 Dollars
Road Construction and Maintenance	1,334,700	1,090,400
Recreation	676,300	552,500
Timber Sale Preparation	156,300	127,700
Timber Stand Improvement	123,800	101,100
Minerals, Land Line Location, Fire Management, and Miscellaneous	6,817,900	5,570,200
Young Adult Conservation Corps	57,500	47,000
Range and Wildlife	662,400	541,200
General Administrative Expenses	1,225,400	1,001,100
Total	11,054,300	9,031,200

By law, 25 percent of the revenues collected by the U.S. Forest Service must be returned to the States to be used for schools and roads in the counties where the National Forest System lands are located. In 1980, receipts for the Forest were as follows:

Receipt Item	1980 Dollars	1978 Dollars
Timber	206,563	168,761
Grazing	294,912	240,941
Recreation Uses	44,197	36,109
Other Land Uses	74,885	61,181
Power	197	161
Minerals	9,699	7,924
Admission User Fees	55,432	45,288
Knutson-Vandenberg Act Funds	200,392	163,720
Timber Purchaser Road Credit	27,700	22,630
Total	913,976	746,714
Total Payment to Counties (25% of Total)	228,495	196,680

The fiscal year 1980 payments from the Forest were allocated to counties as follows:

Payments to Counties

County	Acres of San Juan National Forest Within County	Payment 1980 Dollars	Payment 1978 Dollars
Archuleta	401,118	49,071	40,091
Conejos	4,242	519	424
Dolores	353,011	43,185	35,282
Hinsdale	179,516	21,961	17,942
La Plata	393,598	48,151	39,339
Mineral	139,005	17,005	13,893
Montezuma	243,332	29,768	24,320
Rio Grande	5,237	641	524
San Juan	144,558	17,684	14,448
San Miguel	4,165	510	417
Total	1,867,782	228,495	186,680



IV. environmental consequences

CHAPTER IV

ENVIRONMENTAL CONSEQUENCES

OVERVIEW

Environmental consequences are the effects and impacts on the physical, biological, social, and economic environment of implementing an alternative. The analysis and evaluation of the consequences provides the scientific and analytic basis for comparison of alternatives. The alternatives considered in detail in developing the San Juan National Forest Land and Resource Management Plan are described in Chapter II.

The environmental consequences of the alternatives result from the application of various combinations of management prescriptions. In each alternative, this mix of prescriptions produces different levels of resource outputs, goods, and services, including recreation capacity, habitat diversity, timber production, water yield, and grazing use. The interaction between the level of outputs and place of their production, yields distinct environmental consequences.

The environmental consequences for all alternatives fall within certain limits because of Forest-wide Management Requirements which were imposed to ensure long-term productivity of the land. These requirements are standards and guidelines that apply to all management prescriptions and are designed to protect Forest resources and mitigate adverse impacts. The alternatives considered in detail therefore do not produce any extreme environmental consequences. See Appendix D of this document and Chapter III of the Forest Plan for the detailed Forest-wide Management Requirements and Management Area Prescriptions.

This Chapter displays output levels by alternative and describes the direct and indirect environmental consequences that result. Direct environmental effects are defined as those occurring at the same time and place as the initial cause or action. Indirect effects are those that occur later in time or are spatially removed from the activity, but which are nevertheless significant in the foreseeable future. Environmental interactions within alternatives can be very complex. A change in one output can have secondary or "chain-reaction" effects resulting in changes in other outputs.

Predicted outputs for the 50-year planning horizon were developed using the linear programming model (FORPLAN) as well as the resource-specific processes developed and documented in Planning Action 2, "Process Criteria for the Forest Plan." These predictions are based on quantification of the integrated relationships between the renewable resources of the San Juan National Forest. Relative differences between alternatives are obvious from the output displays for each resource. Additional detail on the predictions for each alternative is included in planning records on file at the San Juan National Forest Supervisor's Office.

In addition to the environmental consequences portrayed within each resource element discussion, additional resource or activity outputs for Regional, or Resource Planning Act (RPA), requirements are also displayed. These are found in Appendix K, Selected Outputs and Activities of Alternatives.

DIRECT AND INDIRECT ENVIRONMENTAL EFFECTS

As explained in the Overview of this chapter, environmental consequences result from the application of various combinations of management prescriptions in the respective alternatives. Table IV-1 shows the acreage allocation by prescription for each alternative.

RECREATION

Dispersed Recreation

Table IV-2 displays predicted dispersed recreation use and theoretical capacity in thousands of recreation visitor days. It is assumed that the predicted use will increase at the levels shown. The column entitled Total Dispersed Recreation includes off-road motorized recreation. This category of recreation is also displayed separately in the right hand column.

All alternatives meet the predicted demand for total dispersed recreation. Alternative B provides for an extremely high dispersed capacity because it is a high market alternative, placing emphasis on timber and range with accompanying road building and high capacity Recreation Opportunity Spectrum (ROS) Classes.

Another illustration of dispersed recreation capability is found in Table IV-3 which displays acres of ROS Classes by the various alternatives. These acreage differences by alternatives are a result of the interaction of various prescriptions. It can be seen, for example, that the high market alternatives allocate the majority of the San Juan National Forest acreage to the Roaded Natural Appearing and Rural ROS Classes, where dispersed capacities are high. This is because high market outputs can be provided only through the application of prescriptions which tend to maximize market resources, require considerable additional road building and hence provide high dispersed capacities. Conversely, low market alternatives have a high acreage in the low capacity ROS Classes, since little additional road building is required.

Each alternative has a different effect on the amount of Primitive and Semi-primitive ROS Classes, as wilderness acres increase or decrease, and as market resources are developed. Currently, there are 1,238,000 acres in the Primitive and Semi-primitive ROS Classes. This represents 66 percent of the total Forest acreage.

Table IV-4 illustrates the percentage of San Juan National Forest acreage retained in the Primitive and Semi-primitive Classes under the various alternatives.

TABLE IV-1

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E	F	G	H
A_1	High level of livestock production; mechanical practices for range improvement.	--	57,691	52,291	73,917	--	12,386	73,917	26,852
A_2	High level of livestock production; no mechanical practices for range improvement.	--	28,837	8,406	95,280	17,892	15,690	93,200	19,924
B	High levels of livestock and timber production; increased water yield; improved wildlife habitat.	112,193	198,715	99,960	169,183	261,213	128,521	170,196	241,356
C	High level of timber production; only compatible management activities will occur.	--	188,908	73,901	71,782	--	--	64,935	--
D	High levels of timber production; improved wildlife habitat and recreation.	71,734	132,128	109,103	235,178	122,111	767,682	227,936	302,115
E	High quality wildlife habitat; moderate to high timber production on commercial forest land.	--	217,283	20,960	29,425	78,767	236	29,425	41,952
F_1	High quality wildlife habitat; high timber production on commercial forest land; livestock grazing is excluded from regenerating stands.	2,525	17,987	376	11,149	18,666	--	11,149	25,388
F_2	Same as F_1, except limited livestock grazing is permitted in regenerating stands.	65,031	37,855	60,206	108,943	32,024	70,335	108,943	125,749
G_1	Semi-primitive motorized recreation; some grazing; some commercial timber production.	155,409	44,968	132,208	41,348	131,432	--	41,348	43,579
G_2	Semi-primitive motorized recreation; some grazing; no commercial timber production.	90,913	9,523	128,280	13,325	88,963	54,254	13,170	32,876
H	High quality semi-primitive non-motorized recreation; no commercial timber production.	492,116	--	615,393	--	101,412	86,047	--	266,888
I	Winter sports sites.	2,567	14,664	15,824	14,792	8,199	2,567	14,547	9,609
J	Scenic qualities along travel routes.	182,297	538	50,887	34,840	56,470	46,125	34,831	57,619

TABLE IV-1 (Continued)

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E	F	G	H
8	Wilderness (with minimum restrictions on visitor numbers and activities.)								
8a	Very high levels of solitude; very high opportunities for challenge, risk, self-reliance and initiative.	-- --	277,964 (63,815)*	292,004 (63,815)*	277,964 (63,815)*	322,944 (63,815)*	277,964 (63,815)*	199,640 (52,455)*	322,944 (63,815)*
8b	High levels of solitude; high opportunities for challenge, risk and self-reliance.	-- --	33,600 (26,441)*	34,400 (26,441)*	33,600 (26,441)*	44,320 (26,441)*	33,600 (26,441)*	17,280 (26,441)*	44,320 (26,441)*
8c	Moderate levels of solitude; moderate opportunities for challenge, risk and self-reliance.	-- --	41,280 (184,367)*	42,240 (184,367)*	41,280 (184,367)*	42,240 (184,367)*	41,280 (184,367)*	14,560 (147,847)*	42,240 (184,367)*
8d	Low levels of solitude; low opportunities for challenge, risk and self-reliance.	--	7,840 (1,380)*	7,840 (1,380)*	7,840 (1,380)*	8,480 (1,380)*	7,840 (1,380)*	2,624 (1,380)*	8,480 (1,380)*
8	Wilderness (with controls on visitor numbers and activities.)								
8e	Very high levels of solitude; very high opportunities for challenge, risk, self-reliance and initiative.	345,664 (58,335)*	-- --	-- --	-- --	-- --	-- --	146,024 (11,360)*	-- --
8f	High levels of solitude; high opportunities for challenge, risk and self-reliance.	52,320 (30,371)*	-- --	-- --	-- --	-- --	-- --	35,040 --	-- --
8g	Moderate levels of solitude; moderate opportunities for challenge, risk and self-reliance.	44,320 (184,797)*	-- --	-- --	-- --	-- --	-- --	29,760 (36,520)*	-- --
8h	Low levels of solitude; low opportunities for challenge, risk and self-reliance.	8,480 (2,500)*	-- --	-- --	-- --	-- --	-- --	5,856 --	-- --
K_3	Maintenance of the qualities of an area which make it possible for inclusion in the National Wilderness Preservation System; to be used on all Wilderness Study Areas, regardless of the Plan's recommendation, until Congress acts (acres are shown within other management areas except in Alternative F.)	--	--	--	--	--	90,100	--	--

TABLE IV-1 (Continued)

Acreage Allocation by Management Area Prescription for Each Alternative

Management Area Prescription	Emphasis	Alternatives A	B	C	D	E	F	G	H
L_1	Chimney Rock Archaeological Area, restricted public use.	3,160	--	--	3,160	--	3,160	3,160	--
L_2	Chimney Rock Archaeological Area, increased public use.	--	3,160	3,160	--	3,160	--	--	3,160
M	Riparian areas.**	37,704	40,087	39,763	40,087	38,407	37,704	37,704	38,407
N	Wild and Scenic River corridors.	18,221	20,213	20,213	20,213	18,221	18,221	18,221	18,221
O	Research Natural Areas.	5,787	1,928	2,302	1,928	2,302	1,928	1,928	2,302
P_1	High water production on lands suitable for timber production.	--	194,208	--	70,774	62,489	--	51,678	--
P_2	High water production on lands unsuitable for timber production.	--	831	--	--	5,998	--	--	--
Q	Developed recreation sites (acres are contained within other management areas).	(534)	(562)	(550)	(428)	(550)	(550)	(428)	(562)
R	Low to moderate livestock production; low density dispersed recreation; no commercial timber production.	177,341	297,574	58,065	471,744	402,072	172,142	420,710	193,801
Total		1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782

* Acres in parentheses are within Lizard Head, South San Juan or Weminuche Wildernesses but are not on the San Juan National Forest.

** Riparian areas were not separated out for wilderness areas or when Wilderness Study Areas were determined suitable for wilderness in each alternative.

TABLE IV-2

Predicted Dispersed Recreation Use and Capacity (In thousands of recreation visitor days expressed as an annual average of the time period indicated)

Alternative	Time Period	Total Dispersed Recreation		Off-Road Motorized Recreation	
		Theoretical Capacity 1/	Predicted Use	Theoretical Capacity 1/	Predicted Use
Current Use	1980	2278	878	178	63
A	1981-1985		1250		80
	1986-1990		1520		120
	1991-2000		1680		190
	2001-2010		1840		260
	2011-2020		2000		330
	2021-2030	3340	2150	375	390
B	1981-1985		1250		80
	1986-1990		1520		100
	1991-2000		1855		120
	2001-2010		2185		140
	2011-2020		2415		160
	2021-2030	16270	2540	234	175
C	1981-1985		1250		80
	1986-1990		1520		120
	1991-2000		1800		160
	2001-2010		1960		200
	2011-2020		2130		230
	2021-2030	6247	2300	341	250
D	1981-1985		1250		80
	1986-1990		1520		120
	1991-2000		1855		160
	2001-2010		2185		190
	2011-2020		2415		220
	2021-2030	10184	2540	328	240
E	1981-1985		1250		80
	1986-1990		1520		110
	1991-2000		1855		140
	2001-2010		2185		160
	2011-2020		2415		180
	2021-2030	4884	2540	252	190
F	1981-1985		1250		80
	1986-1990		1520		100
	1991-2000		1855		120
	2001-2010		2185		140
	2011-2020		2415		155
	2021-2030	3739	2540	178	165
G	1981-1985		1250		80
	1986-1990		1520		120
	1991-2000		1855		150
	2001-2010		2185		180
	2011-2020		2415		200
	2021-2030	9840	2540	300	220
H	1981-1985		1250		80
	1986-1990		1520		100
	1991-2000		1855		120
	2001-2010		2185		140
	2011-2020		2415		155
	2021-2030	5069	2540	178	165

1/ Maximum theoretical capacity achieved by the alternative by the end of the 50-year period. These theoretical capacities were determined through the procedure detailed in FSM 1909.12, Recreation Input to Land and Resource Management Planning.

TABLE IV-3

Recreation Opportunity Spectrum Class Acres by Alternatives (Thousand acres)

Alternative	Primitive	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Rural	Urban
Current	310	764	164	618	11	0
A	352	718	346	390	62	0
B	310	236	216	599	507	0
C	326	732	315	324	171	0
D	310	323	303	647	285	0
E	326	629	233	575	105	0
F	310	335	164	1029	30	0
G	352	342	277	621	276	0
H	326	511	164	769	98	0

TABLE IV-4

Amount of Total Forest Acreage in Primitive and Semi-Primitive Recreation Opportunity Spectrum (ROS) Classes by Alternative

Alternative	Acreage in Primitive and Semi-Primitive ROS Classes (Thousand Acres)	Percentage of Total Forest Acres
Current	1,238	66
A	1,416	76
B	762	41
C	1,373	74
D	936	50
E	1,188	64
F	809	43
G	971	52
H	1,001	54

The alternatives where the various Wilderness Study Areas (WSA) are determined suitable for wilderness would have less potential for increased recreation visitor days (RVD's) because of the desired primitive experience associated with wilderness. The alternative in which the respective WSA's are considered suitable for wilderness are: West Needle--Alternatives A, C, E, G, and H; Piedra--Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G. The maximum difference in RVD's or value "foregone" when the WSA is considered suitable in an alternative is indicated in Table IV-5.

TABLE IV-5

Potential Recreation Visitor Days (RVD's) Foregone* - Wilderness Suitability or Unsuitability

Area	Suitable	Unsuitable	RVD's Foregone
West Needle	24,600	126,400	101,800
Piedra	52,700	242,500	189,900
South San Juan Expansion	15,600	42,700	27,100

* Potential Recreation Visitor Days - Based on potential recreation opportunities and desired use.

Developed Recreation (other than Downhill Skiing)

Except for a few site-specific situations, developed recreation site capacity is sufficient to meet projected demands throughout most of the 50-year planning period. For this reason, no alternatives were developed which depict a great increase in new capacity, and consequently, the variations in recreation visitor days (RVD's) between alternatives in Table IV-6 are not dramatic.

Under all alternatives, seasonal closures will be used for management purposes to change the managed season of use as listed in the Recreation Information Management (RIM) System. Management purposes would include, for example, reaction to low use because of weather or economic conditions.

The predicted use effects of Alternatives C, E, and F are identical. This is in keeping with the philosophies of these alternatives, in which C addresses a need to maintain developed recreation outputs at current

TABLE IV-6

Predicted Developed Recreation Use and Theoretical Developed Recreation Capacity (In thousands of recreation visitor days expressed as an annual average of the time period indicated)

Alternative	Time Period	Developed Recreation Theoretical Capacity	Developed Recreation Predicted Use	Downhill Skiing Theoretical Capacity	Downhill Skiing Predicted Use	Total Developed Recreation Theoretical Capacity	Total Developed Recreation Predicted Use
Current	1980*	2,261	583	314	138	2,575	721
A	1981-1985	2,207	670	500	165	2,707	835
	1986-1990	2,207	780	500	195	2,707	975
	1991-2000	2,340	1,020	500	260	2,840	1,280
	2001-2010	2,400	1,230	500	315	2,900	1,545
	2011-2020	2,400	1,410	500	365	2,900	1,775
	2021-2030	2,400	1,485	500	385	2,900	1,870
50 Yr. Total		117,470	58,700	25,000	15,050	142,470	73,750
B	1981-1985	2,281	685	755	165	3,036	850
	1986-1990	2,281	820	755	350	3,036	1,170
	1991-2000	2,388	1,070	1,121	550	3,509	1,620
	2001-2010	2,388	1,290	1,718	790	4,106	2,080
	2011-2020	2,388	1,480	2,316	1,060	4,704	2,540
	2021-2030	2,388	1,560	2,659	1,250	5,047	2,810
50 Yr. Total		118,330	61,525	85,690	39,075	104,020	100,600
C	1981-1985	2,335	680	755	165	3,090	845
	1986-1990	2,335	795	755	350	3,090	1,145
	1991-2000	2,468	1,040	1,121	550	3,589	1,590
	2001-2010	2,528	1,250	1,718	790	4,246	2,040
	2011-2020	2,528	1,430	2,316	1,060	4,844	2,490
	2021-2030	2,528	1,510	2,659	1,250	5,187	2,760
50 Yr. Total		123,870	59,675	85,690	39,075	209,560	98,750
D	1981-1985	2,141	620	755	165	2,896	785
	1986-1990	2,141	720	755	350	2,896	1,070
	1991-2000	2,095	930	1,121	550	3,216	1,480
	2001-2010	1,975	1,110	1,718	790	3,693	1,900
	2011-2020	1,975	1,270	2,316	1,060	4,291	2,330
	2021-2030	1,975	1,320	2,659	1,250	4,634	2,570
50 Yr. Total		101,610	53,000	85,690	39,075	187,300	92,075
E	1981-1985	2,335	680	755	165	3,090	845
	1986-1990	2,335	795	755	350	3,090	1,145
	1991-2000	2,468	1,040	1,121	550	3,589	1,590
	2001-2010	2,528	1,250	1,514	710	4,042	1,960
	2011-2020	2,528	1,430	1,908	940	4,436	2,370
	2021-2030	2,528	1,510	2,047	1,090	4,575	2,600
50 Yr. Total		123,870	59,675	73,450	35,475	197,320	95,150
F	1981-1985	2,261	680	500	165	2,761	845
	1986-1990	2,261	795	500	195	2,761	990
	1991-2000	2,335	1,040	500	260	2,835	1,300
	2001-2010	2,335	1,250	500	315	2,835	1,565
	2011-2020	2,335	1,430	500	365	2,835	1,795
	2021-2030	2,335	1,510	500	385	2,835	1,895
50 Yr. Total		116,010	59,675	25,000	15,050	141,010	74,725
G	1981-1985	2,141	620	755	165	2,896	785
	1986-1990	2,141	720	755	350	2,896	1,070
	1991-2000	2,095	930	1,121	550	3,216	1,480
	2001-2010	1,975	1,110	1,718	790	3,693	1,900
	2011-2020	1,975	1,270	2,316	1,060	4,291	2,330
	2021-2030	1,975	1,320	2,659	1,250	4,634	2,570
50 Yr. Total		101,610	53,000	85,690	39,075	187,300	92,075
H	1981-1985	2,227	685	755	165	2,982	850
	1986-1990	2,227	820	755	350	2,982	1,170
	1991-2000	2,393	1,070	1,121	550	3,514	1,620
	2001-2010	2,452	1,290	1,514	710	3,966	2,000
	2011-2020	2,452	1,480	1,908	940	4,360	2,420
	2021-2030	2,452	1,560	2,047	1,090	4,499	2,650
50 Yr. Total		119,760	61,525	73,450	35,475	193,210	97,000

*109 thousand visitor days at McPhee recreation sites have been added to the 1980 current levels for comparison purposes. McPhee recreation sites are planned and will be available for public use by 1985.

management levels as projected; F is the no action alternative; the RPA objectives of E will also be met by maintaining current management as projected. Trailheads planned for construction under C and E increase capacity over that shown under F.

Alternative A emphasizes non-market outputs, and calls for the elimination of three of the least cost-efficient, low-use developed sites on the San Juan National Forest. The effect of this can be seen from the slightly reduced RVD's for Alternative A for both capacity and predicted use.

Alternatives D and G call for more reduction in capacity because only the most cost effective sites are retained for consideration of operation by concessionaires. All of the least cost-efficient and low use sites are closed, and the intermediate cost sites are retained for Forest Service operation at a reduced service level. Still, the variation from the no action alternative is not extreme, since only the lowest use sites are being closed, and use predictions for the retained sites tend to keep expected RVD's at a high level.

Alternative B emphasizes market outputs. In keeping with the theory that capacity needs to be increased at only a few heavily used sites, the variation from no action, while an increase, is again not dramatic.

Alternative H is similar to B in that the heavy use sites are expanded and the projected RVD outputs are not much different. Alternative H closes five least cost-efficient and low use recreation sites. The rationale is to develop the capacity needed to prevent site deterioration and to enhance the visitor's recreation experience.

A comparison of theoretical capacity and predicted use across the various alternatives might at first appear misleading. For example, Alternative C has a higher 50-year theoretical capacity than Alternative B, yet has a lower 50-year total predicted use. This occurs because trailheads are planned for construction under C, while none are planned under B. Trailheads serve to increase developed site capacity, but do not produce a proportionately similar amount of use, since their purpose is to serve the needs of dispersed recreationists. Conversely, under B and H, the addition of capacity at heavily used sites, such as family-type campgrounds, tends to increase predicted use, since those heavily used sites will presumably continue to experience high use.

Table IV-7 displays the developed sites by name, and shows whether they would be expanded or closed, and how they would be operated under the various alternatives.

Downhill Skiing

Table IV-6 displays the predicted downhill skiing use by alternative. The data for the "no action" alternative (Alternative F) may be used as a basis for comparison. The RVD's here are those projected for Purgatory and Stoner Ski Areas based upon authorized or anticipated expansion capacities.

TABLE IV-7

Proposed Management of Developed Recreation Sites by Alternative*

Alternative	Sites to be Closed	Sites to be Expanded	Sites to be Reconstructed or Rehabilitated by 1990	Sites to be Considered for Concessionaire Operation	Sites Open and Operated by San Juan National Forest	Capacity in Persons-At-One-Time Added (+) or Eliminated (-)
Current (1980)					All = 5,875 PAOT's	0
A	Thompson Park C.G. Cherry Creek P.G. San Juan Overlook	None	None	None	All Others	-430
B	None	South Mineral C.G. Middle Fork C.G.	Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G. Transfer C.G. Ute C.G. East Fork C.G. Old Timers C.G.	None	All Others	+165
C	None	None	Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G.	None	All	0
D	Big Water Spring C.G. Dolores Canyon Overlook Thompson Park C.G. Transfer C.G. Transfer P.G. San Juan Overlook Ute C.G. Blanco River C.G. Piedra P.G. Vallecito C.G. (50 units) Pine River C.G. Vallecito P.G.	None	Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G.	Priest Gulch C.G. Teal C.G. & Boating Site West Fork C.G. Wolf Creek C.G. Cimarrona C.G. Williams Creek C.G. Bridge C.G. East Fork C.G. Old Timers C.G. & Boating Site Graham Creek C.G. & Boating Site Miller Creek C.G. & Boating Site Florida C.G. Transfer Park C.G. North Canyon C.G. Pine Point C.G. Middle Mountain C.G. Florida P.G.	All Others	-1,195

TABLE IV-7 (Continued)

Proposed Management of Developed Recreation Sites by Alternative*

Alternative	Sites to be Closed	Sites to be Expanded	Sites to be Reconstructed or Rehabilitated by 1990	Sites to be Considered for Concessionaire Operation	Sites Open and Operated by San Juan National Forest	Capacity in Persons-At-One-Time Added (+) or Eliminated (-)
E	None	None	Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G.	None	All	0
F	None	None	Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G.	None	All	0
G	Same as Alternative D	None	None	Same as Alternative D	All Others	-1,195
H	Thompson Park C.G. Ute C.G. San Juan Overlook Piedra P.G. Dolores Canyon Overlook	South Mineral C.G. Middle Fork C.G.	Transfer C.G. Old Timers C.G. Graham Cr. C.G. Pine Point C.G. Chimney Rock Site North Canyon C.G.	South Mineral C.G. Old Timers C.G. Graham Creek C.G. North Canyon C.G. Pine Point C.G. Middle Mountain C.G.	All Others	-410

C.G. = Campground
P.G. = Picnic ground

* The McPhee Recreation Sites, McPhee Campground and House Creek Campground, will be available for public use by 1985. These campgrounds are being constructed in conjunction with the McPhee Reservoir Project. The anticipated persons-at-one-time (PAOT's) capacity of these developed sites will be 1,125; the anticipated recreation visitor days (RVD's) for the entire Reservoir, including dispersed areas, will be 239,300, and theoretical capacity will be 343,915 RVD's. Plans are to have both campgrounds operated by concessionaires. These additional 1,125 PAOT's are not included in the current amount of 5,875 PAOT's or in the column showing PAOT's added or eliminated.

Alternative A, while emphasizing non-market outputs, does require that the currently authorized skier capacity be fulfilled to meet the minimum social and economic needs of the area. Therefore Alternative A is identical to Alternative F with regard to downhill skiing.

The remaining alternatives also call for the development of currently authorized capacity. In addition, however, they also provide for a potential increase in downhill skiing capacity by allocating inventoried ski areas to management that will retain the potential. In these remaining alternatives, some or all of the five inventoried ski areas on the San Juan National Forest rated "good" or better are retained for this opportunity.

Alternative B, as the high market alternative, provides for the opportunity for development of East Fork by the year 1990, Grayrock-Cascade by 2000, Dunton and Echo Basin by 2010, and Windy Pass by 2030. If developed, these new areas would more than triple skier capacity of Alternative F by the end of the planning period.

Alternatives C, D, and G are identical to B with respect to downhill skiing, and retain the same opportunities for development of new areas. Alternative C expresses a need for an increase in skier capacity to respond to public issues and management concerns and local social and economic needs. Alternative D is a high market alternative with reduced Forest Service budget levels, yet it permits the private sector to develop skier capacity to a high market level in expectation of high dollar returns to the United States Treasury. Alternative G is also a high market level with expected high dollar returns.

Alternatives E and H retain the opportunity for development of East Fork by the year 1990, Grayrock-Cascade by 2000, and Windy Pass by 2010.

Table IV-8 illustrates, by alternative, existing areas and predicted development of potential ski areas with the estimated skier capacity that would be provided, if they are developed, by the end of the planning period.

Visual Resource

The entire San Juan National Forest was inventoried for visual quality. The system used for this inventory assigns visual quality objectives (VQO's) of Preservation, Retention, Partial Retention, Modification and Maximum Modification to areas of the San Juan National Forest. VQO's are quantified on how readily the areas are visible, the number of persons likely to view the areas, and the uniqueness or variety of a particular landscape. Acres by inventoried VQO's are shown in Table IV-9 and are used for comparison of alternatives.

The objective of visual resource management is to attain the highest possible visual quality commensurate with other appropriate public uses, costs, and benefits. Emphasis is put on areas of Retention and Partial Retention, to ensure that activities meet guidelines dictated by the visual quality objectives and are harmonious with the characteristic landscape.

TABLE IV-8

Ski Areas Developed by Alternative - 50-Year Planning Period (Development is indicated by an "X")

Name of Area	Alternatives A	B	C	D	E	F	G	H
Purgatory (Existing Area)	X	X	X	X	X	X	X	X
Stoner (Existing Area)	X	X	X	X	X	X	X	X
East Fork		X	X	X	X		X	X
Grayrock-Cascade		X	X	X	X		X	X
Windy Pass		X	X	X	X		X	X
Dunton		X	X	X			X	
Echo Basin		X	X	X			X	
Estimated Total Theoretical Capacity by 2030 (Thousands of Recreation Visitor Days)	500	2,659	2,659	2,659	2,047	500	2,659	2,047

The land allocation of each alternative has a unique distribution of visual quality objectives for specific areas, which is consistent with the general philosophy of the alternative. For example, in response to Alternative A's philosophy, all areas inventoried as Retention and Partial Retention were assigned management prescriptions predominantly emphasizing recreation and visual quality.

In Alternative C, those San Juan National Forest areas readily visible from heavily traveled routes were assigned prescriptions that emphasized Retention and Partial Retention VQO's. In Alternative B, less emphasis was put on visual quality; therefore, less area was allocated to prescriptions emphasizing Retention and Partial Retention.

Alternatives are rated and ranked as to their overall compatibility with the goals and objectives of visual resource management. This ranking, from most to least compatible, is as follows: A, C, E, H, G, D, F, B. The criteria for this ranking are the acres allocated to the various VQO's. Alternatives that have significant allocations of Preservation, Retention and Partial Retention and would therefore produce overall improvement to visual quality are A, C, and E. Alternatives H, G, D, and F would have some negative effects, and Alternative B would have a significant negative change.

Table IV-9 illustrates the total acres of each VQO assigned to each alternative through prescription allocation. Also indicated are the percent changes from the current inventoried visual quality objective.

TABLE IV-9

Alternative Visual Quality Objectives (Thousand acres)

VQO	Existing Inventory	Alternative A	B	C	D	E	F	G	H
Preservation	363	456	363	380	363	420	453	453	420
% ±		+25	0	+4	0	+16	+24	+24	+16
Retention	448	1,011	272	952	405	631	312	370	535
% ±		+125	-39	+112	-9	+40	-30	-17	+19
Partial Retention	574	191	213	145	317	289	292	295	228
% ±		-66	-62	-74	-44	-49	-49	-49	-60
Modification	456	210	333	239	442	369	783	437	596
% ±		-54	-27	-47	-3	-19	+71	-4	+30
Max. Modification	27	0	687	152	341	159	28	313	89
% ±			+2,444	+462	+1,162	+488	+3	+1,059	+229

The local short-term consequences of some management activities such as road construction and timber harvest will have a net reduction of visual quality. While these activities may occur in certain portions of the San Juan National Forest under a given alternative, other activities may be occurring at the same time in other portions such as road obliteration and vegetation manipulation to increase vegetation diversity for wildlife and improve visual quality. Long-term consequences of harvesting timber in most areas, and other vegetation manipulation projects will improve the visual resource. All alternatives represent a distribution of vegetation treatment across the San Juan National Forest with

the intent of maintaining a healthy forest condition. With the exception of Alternative B, there will be no significant short or long-term decline in visual quality under any alternative, on a Forest-wide basis. Short-term reduction in visual quality can be partially mitigated by the Forest-wide Management Requirements.

In alternatives where the Wilderness Study Areas (WSA's) are determined suitable for wilderness, the natural landscape character would be maintained with ecological changes only within the WSA. There would be minor visual impacts as a result of anticipated increased human and horse use such as trail degradation and dispersed site use but this is insignificant in terms of total acreage of the area.

Where determined unsuitable for wilderness, the consequences of some management practices would reduce the existing visual quality. Examples of those practices are road construction and certain timber harvest methods.

WILDERNESS

The current total designated wilderness area of the San Juan National Forest is 360,684 acres. This figure includes wilderness added by the Colorado Wilderness Act of 1980. These are: Lizard Head, South San Juan, and the Weminuche additions.

The effects of management alternatives are also displayed for those portions of the Lizard Head Wilderness on the Uncompahgre National Forest, and the Weminuche and South San Juan Wilderness on the Rio Grande National Forest as discussed in Chapter I, page I-3.

The total existing designated wilderness acreage does not change in any alternative. (See Table IV-10.) However, different combinations of Wilderness Study Areas on the San Juan National Forest (West Needle, Piedra, South San Juan Wilderness Expansion) are identified as suitable or unsuitable for wilderness designation in the various alternatives. (An analysis of the Wilderness Study Areas begins on page 21.) The identifications by alternative are summarized in Table IV-11. To indicate total wilderness acreage on the San Juan National Forest, the existing wilderness acreage is also shown.

Protection of, and restoration of disturbance to the biological and physical resources of wilderness will be emphasized in all alternatives.

In Alternative F, all minerals leasing applications for areas in existing wilderness and Wilderness Study Areas would be recommended to BLM for denial of minerals leasing. Other than that, effects of mineral exploration and development in existing wildernesses will not change by alternative and may range from short-term restorable impacts of geophysical investigation and exploratory drilling, to long-term restorable impacts of full mineral development programs. The effects in Wilderness Study Areas will vary by alternative depending on whether or not the individual areas are identified as suitable or unsuitable for wilderness. See the Minerals Section of this Chapter for a detailed discussion of recommendations for minerals leasing in existing wildernesses and Wilderness Study Areas.

TABLE IV-10

Existing Wilderness By Administrative Unit

Name	Net National Forest Acres	Administrative Unit
Lizard Head Wilderness	21,400	San Juan N. F.
Lizard Head Wilderness	18,600	Uncompahgre N. F.
	40,000	
Weminuche Wilderness	294,284	San Juan N. F.
Weminuche Wilderness	168,940	Rio Grande N. F.
	463,224	
South San Juan Wilderness	45,000	San Juan N. F.
South San Juan Wilderness	88,463	Rio Grande N. F.
	133,463	

Area restrictions presently in effect for resource protection in certain heavily impacted areas would be applied in any alternative. Also, efforts to encourage low impact camping methods will continue in conjunction with other management activities to aid maintaining the opportunity for a quality wilderness experience in all alternatives.

The alternatives have varying effects on opportunities for solitude ranging from high use levels with moderate opportunities for solitude, to low use levels with high opportunities for solitude. Wilderness is presently categorized into four opportunity classes (transition, primitive, semi-primitive, and pristine), ranging from high visitation day-use type corridors to trailless areas where contact with other visitors is low. The management area prescriptions outline the management intent within the four opportunity classes.

The wilderness recreation opportunity class acres for the San Juan National Forest by alternative are summarized in Table IV-12. This table includes the opportunity classes for the San Juan National Forest portion of existing wildernesses as well as Wilderness Study Areas when identified as suitable for wilderness.

More detailed information on recreation opportunity class acres by alternative and Forest as well as estimated wilderness visitor use by alternative and time periods, estimated livestock grazing by alternative and time period, and mineral leasing recommendations for designated wilderness can be found in Appendix M.

TABLE IV-11

Wilderness Acres by Alternative (San Juan National Forest)

Alternative	A	B	C	D	E	F	G	H
Wilderness (Existing)								
Weminuche	294,284	294,284	294,284	294,284	294,284	294,284	294,284	294,284
Lizard Head	21,400	21,400	21,400	21,400	21,400	21,400	21,400	21,400
South San Juan	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000
Subtotal	360,684	360,684	360,684	360,684	360,684	360,684	360,684	360,684
Wilderness Study Area (Identified as suitable for wilderness)								
West Needle	15,800	0	15,800	0	15,800	0	15,800	15,800
BLM West Needle Contiguous	(4,540)		(4,540)		(4,540)		(4,540)	(4,540)
Piedra	41,500	0	0	0	41,500	0	41,500	41,500
South San Juan Expansion	32,800	0	0	0	0	0	32,800	
Total 1/	450,784	360,684	376,484	360,684	417,984	360,684	450,784	417,984

1/ The capable portion of the West Needle Contiguous (Bureau of Land Management administered land) is determined suitable for wilderness designation in Alternatives A, C, E, G, and H. Total acres shown do not include the BLM acres.

TABLE IV-12

Wilderness Recreation Opportunity Class Acres - San Juan National Forest

Alternative	Pristine	Primitive	Semi-Primitive	Transition
A	345,664	52,320	44,320	8,480
B	277,964	33,600	41,280	7,840
C	292,004	34,400	42,240	7,840
D	277,964	33,600	41,280	7,840
E	322,944	44,320	42,240	8,480
F	277,964	33,600	41,280	7,840
G	345,664	52,320	44,320	8,480
H	322,944	44,320	42,240	8,480

Table IV-13 shows the wilderness opportunity class acres by alternative for the total existing wildernesses. See Appendix M for a more detailed listing of opportunity class acres by individual wildernesses and administrative units.

TABLE IV-13

Wilderness Recreation Opportunity Class Acres - Total Existing Wildernesses

Alternative	Pristine	Primitive	Semi-Primitive	Transition
A	403,999	82,691	229,117	10,980
B	341,779	60,041	225,647	9,220
C	355,819	60,841	226,607	9,220
D	341,779	60,041	225,647	9,220
E	386,759	70,761	226,607	9,860
F	341,779	60,041	225,647	9,220
G	409,479	78,761	228,687	9,860
H	386,759	70,761	226,607	9,860

Alternatives B, C, D, E, F, and H, provide opportunities for solitude with a minimum of direct controls on human use. Wilderness management in these alternatives rely more on indirect controls such as education

of the user, through techniques such as signing, and other information methods. Specific direct control will be introduced where there is a demonstrated need because of wilderness resource degradation.

Alternatives A and G are the only alternatives to apply direct user controls such as a permit system, in keeping with the intent to provide for the highest opportunity for solitude through dispersal of users. Alternative A would apply the direct controls throughout all wilderness areas. Alternative G would apply the direct controls on the Piedra and West Needle (if they are designated by Congress), and the west half of the Weminuche, with an indirect control system on the remaining areas.

Using the assumption that wilderness designation tends to draw recreational visitors, the concentration of wilderness use would likely be higher in Alternatives B, C, D and F because of fewer total suitable or designated wildernesses than in the other alternatives. These alternatives, along with E and H to a lesser extent, would release lands that are currently being studied for wilderness suitability to nonwilderness management. The released lands would then be available for a range of activities such as those that are compatible with wilderness values, such as non-motorized recreation, to those that are not, such as timber or road development, depending on alternative allocations.

The estimated wilderness visitor days for the San Juan National Forest by alternative and time periods through the year 2030 are summarized in Table IV-14. This table includes the estimated use for the San Juan National Forest portion of existing wildernesses as well as the estimated use of Wilderness Study Areas when identified as suitable for wilderness.

TABLE IV-14

Estimated San Juan National Forest Wilderness Use (Thousands of visitor days)

	Planning Periods						
Alt.	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	134	175	200	221	244	267	292
B	134	155	172	209	231	258	284
C	134	164	184	224	249	279	308
D	134	155	172	209	231	258	284
E	134	170	193	236	264	297	328
F	134	155	172	209	231	258	284
G	134	175	200	245	275	310	343
H	134	170	193	236	264	297	328

Table IV-15 shows the estimated wilderness visitor days by alternative and time periods for the total existing wildernesses. See Appendix M for a more detailed listing of estimated visitor days by individual wilderness and administrative unit.

TABLE IV-15

Estimated Wilderness Use in Total Existing Wildernesses (Thousands of visitor days)

	Planning Periods						
Alt.	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	249	327	361	406	441	480	531
B	249	327	361	439	484	537	593
C	249	327	361	439	484	537	593
D	249	327	361	439	484	537	593
E	249	327	361	439	484	537	593
F	249	327	361	439	484	537	593
H	249	327	361	439	484	537	593

Analysis of Wilderness Study Areas

This section discusses the Wilderness Study Area analysis of suitability or unsuitability for wilderness designation.

Overview

The standards to be met for inclusion in the National Wilderness Preservation System (NWPS) are established by the Wilderness Act of 1964. Forest Service policy requires that wilderness capability, availability, and need be analyzed prior to determining the suitability or unsuitability of a Wilderness Study Area for inclusion into the NWPS.

Wilderness Capability

Capability for wilderness is determined by the degree to which an area possesses the basic characteristics necessary for wilderness designation and the degree an area can be managed for wilderness. Capability is analyzed without regard to need or availability as wilderness.

West Needle Wilderness Study Area - The West Needle WSA has high wilderness attributes, indicated by its RARE II Wilderness Attribute Rating (WARS). The WSA has a WARS rating of 21 on a scale ranging from 4 to 28. The WARS rating of the WSA is illustrated in detail in Appendix N.

The following are indicators of manageability:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and other natural resource uses can generally be managed to protect wilderness character on both the Forest Service and BLM portions of the WSA. An exception to this is the portion of the West Needle Contiguous WSA north of Molas Creek. This land is adjacent to Molas Lake and Molas Lake Campground, which is on land owned by the town of Silverton. Recreation activities in the vicinity of Molas Lake include fishing, developed site camping, and off-road vehicle use. The terrain is such that there are no topographic or other natural barriers separating the developed recreation area from the WSA. Significant manageability problems would exist in attempting to prevent motorized use from taking place within designated wilderness. Therefore, under each alternative in which the West Needle WSA is identified as suitable for wilderness, an adjustment has been made to exclude this 1,240 acre area which is determined incapable for wilderness.

Mineral activity could also represent a potential manageability problem. Although active mines were specifically excluded from the West Needle Contiguous WSA during the delineation of the eastern boundary, there is a possibility that additional mining claims presently within the WSA could become active. Although most surface disturbances from mining could be mitigated under Federal regulations, some impacts and use conflicts could be expected from exploration and developmental activities.

Size and Shape of the Area

The West Needle and West Needle Contiguous WSA's contain a total of 21,580 acres, 20,340 of which are considered capable for wilderness. This area is relatively compact with boundaries in many areas being determined by well defined topographic features. The area is of sufficient size and shape to be manageable as wilderness. Manageability problems in relation to boundaries are discussed below.

Location Relative to External Influences

The West Needle and West Needle Contiguous WSA's are almost completely bounded by transportation corridors. Along the south and west boundaries is the Durango and Silverton Narrow

Gauge Railroad right-of-way which follows the Animas River. There are very few developments in this segment of the valley, limited to a few cabins and patented mines. The narrow gauge railroad runs several trips per day during summer months, with backpackers using the train as a means of access to the Weminuche Wilderness. The train is a unique historical feature of the area, although some might feel that its proximity to the WSA boundary would detract from a true wilderness experience. The train is also responsible for starting several fires per season along the right-of-way. Most of these are immediately discovered and extinguished by railroad personnel.

U. S. Highway 550 runs along the north and west boundaries of the WSA at distances from one to three miles. This corridor is heavily used during summer and fall months and can be viewed from many locations within the WSA. Forest Road 591 parallels the western boundary of the WSA for approximately four miles at distances of less than a half mile. This road is used by sight-seers, campers, fishermen, and hunters.

Considerable mining activity occurs to the north of the WSA near Silverton, but this is at such a distance as to have no major impacts on the WSA. Of greater significance is the mineral activity along the eastern edge of the West Needle Contiguous WSA. Associated with this activity are helicopter flights over the WSA for purposes of aerial surveys and transportation of men and equipment.

Along the southwest side of the boundary runs the Purgatory Trail, which is fairly heavily used by horseback riders, backpackers, and hunters. The Weminuche Wilderness is east of any point within the WSA.

In summary, there are several types of external influences which could detract from the wilderness environment of the WSA, but many of these are actually means of access to the WSA. Manageability of the WSA in relation to three factors would be dependent upon the extent to which use could be controlled to prevent overcrowding from taking place.

Boundaries

The following points can be made concerning boundaries:

-They can generally be located to avoid conflicts with existing uses and developments. However, under the suitable alternative, mineral activity taking place based on prior rights could present manageability problems within the boundary.

-They can be readily and accurately described in most areas. Problems could exist in locating the western boundary of the West Needle Contiguous WSA north of the Forest Service portion. There are no topographic features to help define the boundary, which is actually the line separating Forest Service and BLM land.

-They can be located in most areas to use features that constitute a barrier to prohibited use or a shield to protect the wilderness environment. An exception is the area of the BLM West Needle Contiguous WSA adjacent to Molas Lake. Here, no barriers exist, and manageability with respect to prohibited uses would pose problems. This area of 1,240 acres is excluded under the suitable alternative.

-They can be located to provide an opportunity for access and trailhead facilities.

Boundary location, in general, poses no major problems with respect to manageability of the area as wilderness.

Based on analysis of both manageability and possession of wilderness characteristics, the West Needle WSA is capable for wilderness.

Piedra Wilderness Study Area - The Piedra WSA has very high wilderness attributes as indicated by its RARE II Wilderness Attribute Rating (WARS). The Piedra WSA rating of 24 is the highest of the 38 RARE II areas on the San Juan National Forest. The rating scale ranges from 4 to 28. The WARS rating is illustrated in detail in Appendix N.

The following are indicators of manageability:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and most other resource uses could easily be managed on the Piedra WSA while protecting wilderness character. Surface disturbances relating to mineral development could be controlled under Forest Service Surface Protection Regulations (36 CFR 228), but some impacts could be expected. Impacts from previous exploration are minimal, but if a major discovery were made, impacts could be severe. A roading system necessary to access mineral development could also have significant impacts on the wilderness character of the area. Otherwise, there would be no problems in managing the area to perpetuate in natural character.

Size and Shape of the Area

The Piedra WSA contains 41,500 acres and is relatively compact. The boundary of the area is determined by well defined topographic features on about one-third of the proposed area. The other two-thirds of the boundary crosses

drainages or follows broad ridges where precise topographic features do not exist. These boundary areas will be difficult, but not impossible to locate on the ground. The area, in order to be managed as wilderness, would require significant boundary location and maintenance to prevent conflicts with other land management activities.

Location Relative to External Influences

The Piedra WSA is located three and one-half miles from U. S. Highway 160 at its nearest point. Forest Road No. 620-622 is within one-quarter mile of the southern boundary and Forest Road No. 631-642 within one-eighth mile of the northern boundary. Considerable timber activity occurs to the north of the WSA. There are minimal external influences that would impair manageability of the area as wilderness. Access is such that users could readily get to the area, yet it is not so close to a major highway as to detract from the wilderness environment.

Boundaries

The following points can be made concerning boundaries on the WSA:

-They can be located to avoid conflict with important existing or potential public uses and developments.

-They can be sufficiently described to be posted on the ground, although location and maintenance will be difficult in some areas of the WSA.

-They can be located in some areas to utilize features that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.

-They can be located to provide an opportunity for access and trailhead facilities.

Therefore, boundary location does not pose a major problem with respect to manageability of the area as wilderness.

Based on analysis of both manageability and possession of wilderness characteristics, the Piedra WSA is determined capable for wilderness.

South San Juan Wilderness Expansion Study Area - The South San Juan Wilderness Expansion Study Area has moderate wilderness attributes indicated by its RARE II Wilderness Attribute Rating (WARS). The WARS rating of the WSA for the Montezuma Peak portion is 20, and the V-Rock Trail portion is 17 on a rating scale of 4 to 28. The WARS rating of the WSA is illustrated in detail in Appendix N.

The following are indicators of manageability:

Ability to Manage the Area as an Enduring Resource of Wilderness and to Protect and Manage its Natural Character

Recreation, grazing and other natural resource uses can be managed in the WSA to protect wilderness character. Although surface disturbances relating to mineral development would be controlled under Forest Service Surface Protection Regulations (36 CFR 228), mining impacts should be expected. Impacts from exploration operations would be minimal, but if major discoveries are made, impacts could be severe. Large scale mineral activity is not compatible with a wilderness environment. Roads necessary to access mineral development could also have significant impacts on the wilderness character of the area. Such developments would limit the ability to manage the area as an enduring resource of wilderness as well as the ability to protect and manage its natural character.

Size and Shape of the Area

The 32,800 acre WSA is composed of two separate areas, both of which adjoin the South San Juan Wilderness. The Montezuma Peak area is relatively compact, and boundaries are determined by well defined topographic features in most areas. The V-Rock Trail area is relatively long and narrow, and boundaries are determined by well defined topographic features on the east and north but not on the west and south. With respect to size and shape, the WSA would generally be manageable as wilderness.

Location Relative to External Influences

The Montezuma Peak area is located approximately 10 miles from U. S. Highway #160 and is within 1/8 mile from Forest Roads #667 to the west and #684 to the north. Additional Forest Roads from the communities of Summitville and Platora on the Rio Grande National Forest come within 1/4 mile of the area on the north and east. The V-Rock Trail area is approximately five miles from U. S. Highway #84 and is within 1/2 mile of Forest Road #663 on the west and within 1/8 mile of Forest Road #660 on the north. Access to both areas is adequate, yet neither area is so close to a major highway as to detract from the wilderness environment.

Considerable activity is taking place on lands adjacent to the WSA. Timber activity and related roads are located to the west and south of V-Rock Trail. Exploratory core drilling has been conducted near Quartz Creek, in the Montezuma Peak area as well as to the north of this area. Appreciable quantities of lead, zinc, silver, and gold have been produced from mining districts adjacent to the WSA as well.

In summary, the WSA is located adjacent to several areas of resource activity which have a moderate potential to detract from the manageability of the area as wilderness.

Boundaries

Boundaries of the WSA could be located on the ground to:

-Avoid conflict with important existing or potential public uses and developments.

-Be readily and accurately described.

-Utilize features in many areas that constitute a barrier to prohibited use and act as a shield to protect wilderness environment.

-Provide an opportunity for access and trailhead facilities.

Boundary location therefore does not pose a major problem with respect to manageability of the area as wilderness.

Based on an analysis of both manageability and possession of wilderness characteristics, the South San Juan Wilderness Expansion Study Area has a moderate capability for wilderness.

Wilderness Availability

Availability indicates the degree to which an area can be committed to wilderness purposes in light of competing demands for other resource uses of the area. Availability is conditioned by an area's value and need for the wilderness resource compared to its value and need for other resource uses. To be considered available, wilderness designation must represent the "highest and best use" of the land over time.

In the planning process, the analysis of each Wilderness Study Area's value and need for other resource uses was incorporated into the assessment of the eight alternatives considered in detail. In the alternatives, the Wilderness Study Areas were analyzed in various allocation combinations to best meet the goals and objectives of a particular alternative. With this analysis procedure, the availability was assessed and an indication of potential values "foregone" determined for each area identified suitable or unsuitable for wilderness. The potential values "foregone" are indicated within applicable environmental consequences discussions throughout this chapter. Table IV-16 is a summary of selected potential outputs or values "foregone" for the alternatives where Wilderness Study Areas were identified suitable for wilderness designation.

Wilderness Need

This indicates the presence of clear evidence supporting current or future public need for additional designated wilderness in the Forest, the Region, or the State. In determining need, consideration is given to whether the wilderness values determined in the capability analysis, both tangible and intangible, outweigh the potential value of non-wilderness resource uses.

TABLE IV-16

Selected Potential Outputs or Values Foregone (Annual units)

Output or Values	Unit	Alternative A	B	C	D	E	F	G	H
Dispersed Recreation Opportunity	Thousand								
West Needle	Recreation	102	-	102	-	102	-	102	102
Piedra	Visitor	190	-	-	-	190	-	190	190
South San Juan	Days								
Expansion		27	-	-	-	-	-	27	-
Total		319	-	102	-	292	-	319	292
Water Yield	Acre-Feet								
West Needle		-	-	-	-	-	-	-	-
Piedra		3,360	-	-	-	3,360	-	3,360	3,360
South San Juan									
Expansion		1,202	-	-	-	-	-	1,202	-
Total		4,562	-	-	-	3,360	-	4,562	3,360
Timber Yield	Million								
West Needle 1/	Board	-	-	-	-	-	-	-	-
Piedra	Feet	6.0	-	-	-	6.0	-	6.0	6.0
South San Juan									
Expansion		2.4	-	-	-	-	-	2.4	-
Total		8.4	-	-	-	6.0	-	8.4	6.0
Livestock Grazing	Animal								
West Needle	Unit	110	-	110	-	110	-	110	110
Piedra	Month	1,015	-	-	-	1,015	-	1,015	1,015
South San Juan									
Expansion		80	-	-	-	-	-	80	-
Total		1,205	-	110	-	1,125	-	1,205	1,125
Additional Wilderness	Acres								
West Needle 2/		15,800	-	15,800	-	15,800	-	15,800	15,800
Piedra		41,500	-	-	-	41,500	-	41,500	41,500
South San Juan									
Expansion		32,800	-	-	-	-	-	32,800	-
Total		90,100	-0-	15,800	-0-	57,300	-0-	90,100	57,300

1/ Does not include biological annual yield potential of .5 million board feet (MMBF) on 3,808 acres which in the analysis was determined to be unsuitable for timber management because of access and economic reasons.

2/ Does not include Bureau of Land Management administered land (West Needle Contiguous WSA) which was also determined suitable for wilderness in Alternatives A, C, E, G, and H.

The planning process considered the current and future public need for additional designated wilderness in the general vicinity of the Wilderness Study Areas.

In considering the need for wilderness, certain assumptions were made:

-Visits to designated wilderness will increase with both an increasing population and a growing awareness of wilderness.

-Some undeveloped lands provide opportunities for a primitive type of recreation outside of wilderness.

-Within social and biological limits, management increases the capacity of established wildernesses to support human use without unacceptable depreciation of the wilderness resource.

Table IV-17 shows the factors considered in determining "need" along with a summary of the factors for each WSA.

FISH AND WILDLIFE

Wildlife Habitat Improvement

Improvement of wildlife habitats will be attained through silvicultural activities, range revegetation, prescribed burning, and other vegetation manipulation practices. These practices are specifically designed to improve habitats for certain management indicator species or groups of species. (Refer to management indicator species discussion in Chapter III, beginning on page III-28.)

Table IV-18 displays the acres of wildlife habitat improvement by planning periods for all alternatives. Habitat improvement is cumulative for an average of 30 years, in that activities implemented in planning period 1 retain their effectiveness through planning period 3. A large proportion of the wildlife habitat improvement shown is to be accomplished through coordination with other resources, (e.g., timber harvesting, reforestation, browse planting, thinning, prescribed fire, and range revegetation projects.)

Riparian habitat improvement is included in the acreages shown in Table IV-18. These habitats are improved and maintained over all five planning periods.

Wildlife habitats are most effectively used when they receive little or no disturbance by human activities. Consequently, the total area available to human use and activities by roads left open for public use, is an indicator of effective use of wildlife habitats. The amount of reduction these activities have upon the acres of improved wildlife habitats is shown in Table IV-19.

Alternatives B and H provide for the most road construction and associated increased human activities in areas now containing few or no roads. Alternatives A and C provide for roading and associated human activities on the smallest amount of acres.

TABLE IV-17

Summary of Wilderness "Need" Factors

Factor	West Needle Wilderness Study Area	Piedra Wilderness Study Area	South San Juan Wilderness Expansion Study Area
Designated wilderness in the vicinity of the proposed area.	There are 13 designated wildernesses within a radius of 100 miles from the proposed WSA. Eleven are in National Forests and two in National Parks. Total area of these existing wildernesses is approximately 1.38 million acres. These range in size from 8,000 to over 463,000 acres and cover a variety of ecosystem types and elevation zones. All are within Colorado and New Mexico, which made them readily accessible from major population centers along the Front Range of the Rocky Mountains as well as areas of the southwest.	There are 15 designated wildernesses within a radius of 100 miles from the proposed WSA. Twelve are in National Forests and three in National Parks. Total area of these existing wildernesses is approximately 1.3 million acres. These range in size from 8,000 to over 463,000 acres, and cover a variety of ecosystem types. All are within Colorado and New Mexico, which make them readily accessible from major population centers along the Front Range of the Rocky Mountains as well as areas of the southwest.	There are 19 designated wildernesses within a radius of 100 miles from the proposed WSA. Fifteen are in National Forests and four are in National Parks. Total area of these existing wildernesses is approximately 1.64 million acres. These range in size from 5,000 acres to over 460,000 acres and cover a variety of ecosystem types and elevation zones. All are within Colorado and New Mexico, which make them readily accessible from the major population centers along the Front Range of the Rocky Mountains as well as areas of the southwest.
Visitor pressure on other wildernesses.	Of the 13 wildernesses within a 100-mile radius, 10 are currently experiencing relatively low usage, one is experiencing moderate usage, and two are experiencing relatively high usage. Expected trend is for use to increase on all areas as Front Range and Sunbelt populations increase. Increased transportation costs will keep some potential visitors away, although this may be more than offset by local residents using wildernesses for day hiking as well as overnight visits.	Of the wildernesses within a 100-mile radius, thirteen are currently experiencing relatively low usage, one is experiencing moderate usage, and one is experiencing relatively high usage. Expected trend is for use to increase on all areas as Front Range and Sunbelt populations increase. Increased transportation costs will keep some potential visitors away, although this may be more than offset by local residents using wilderness areas for day hiking as well as overnight visits.	Of the 19 wildernesses within a 100-mile radius, 15 are currently experiencing relatively low usage, one is experiencing moderate usage, and three are experiencing relatively high usage. Expected trend is for use to increase on all areas as Front Range and Sunbelt populations increase. Increased transportation costs will keep some potential visitors away, although this may be more than offset by local residents using wilderness areas for day hiking as well as overnight visits.
Ability of non-wilderness lands to provide and continue to provide opportunities for unconfined outdoor recreation.	Presently there are a multitude of non-wilderness lands available in the area on which opportunities are available for unconfined outdoor recreation, although this is not expected to remain the case. Increased demands for commodity outputs, especially timber and minerals, will result in the development of many areas presently unroaded.	Presently there are a multitude of non-wilderness lands available in the area on which opportunities are available for unconfined outdoor recreation, although this is not expected to remain the case. Increased demands for commodity outputs, especially timber and minerals, will result in the development of many areas presently unroaded.	Presently there are a multitude of non-wilderness lands available in the area on which opportunities are available for unconfined outdoor recreation, although this is not expected to remain the case. Increased demands for commodity outputs, especially timber and minerals, will result in the development of many areas presently unroaded.

TABLE IV-17 (Continued)

Summary of Wilderness "Need" Factors

Factor	West Needle Wilderness Study Area	Piedra Wilderness Study Area	South San Juan Wilderness Expansion Study Area
Ability of resident plant and animal species to withstand resource development.	There are no known Federal threatened or endangered plant or animal species within the WSA. Big game species use the area for spring, summer and fall habitat. Wolverine habitat does exist, but there is no evidence that this threatened species is present. Pine marten habitat is present, but also without evidence that the species is present. Development of the habitat that would take place under a non-wilderness alternative would most likely not significantly affect any of the species mentioned above.	There are no known Federal threatened or endangered plant species within the WSA. The area serves as an important migration corridor for deer and elk, which would be significantly affected by development, especially roading. The river otter, a State threatened species, can survive in both wilderness and non-wilderness settings, although roading would increase the likelihood of illegal trapping, which could easily decimate a population. Wolverine habitat would be decreased as a result of roading and development.	There are no known Federal threatened or endangered plant or animal species within the WSA. The area possibly contains suitable grizzly bear habitat, which is a species very intolerant of human developments, although the possibility that grizzly bear inhabit the area is very low. Although pine marten and wolverine habitat exist on the area, these species are not determined to be residents.
Need to provide a sanctuary for those species unable to survive in less than primitive surroundings.	No known species in the WSA require completely primitive surroundings for survival.	No known species in the WSA require completely primitive surroundings for survival.	No known species in the WSA require completely primitive surroundings for survival.
Need to preserve certain landform types or ecosystems.	There are no unique landforms that are not found on nearby wildernesses. There are no known unique ecosystems.	There are no unique landforms found on the WSA that are not found on nearby wildernesses. There are no unique ecosystems, although the area has numerous examples of lower elevation mountain ecosystems such as Douglas-fir, aspen, and ponderosa pine that are not represented in other wildernesses in the vicinity.	There are no unique landforms on the WSA that are not found on nearby wildernesses. There are no known unique ecosystems.
Summary of the need for additional wilderness of the type represented.	The need for additional wilderness of the type represented on this WSA is low. The area contains ecosystem and landform types which are represented in abundance on nearby wilderness areas. Conversely, the area contains outstanding visual resources coupled with low potential for commodity resource production.	The need for additional wilderness of the type represented on this WSA is relatively high. The relative abundance of lower elevation mountain ecosystems along with opportunities for unconfined recreation not constrained by severe high-elevation weather make this area fairly unique with respect to other wildernesses.	The need for additional wilderness of the type represented on this WSA is relatively low. There is a large area available for unconfined recreation experiences in wildernesses nearby, and no unique ecosystems or landforms would be added to the National Wilderness Preservation System.

TABLE IV-18

Cumulative Acres of Improved Wildlife Habitat (Thousand acres*)

Alt.	Present (1980) Acres	Planning Periods 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	390	545	700	778	736	606	626
B	390	679	869	1000	1064	778	852
C	390	520	651	710	692	583	595
D	390	528	666	719	658	589	622
E	390	607	825	981	1106	1013	1087
F	390	562	735	863	941	852	803
G	390	542	694	745	717	604	671
H	390	583	777	1019	1111	1045	1028

*Figures shown are the total acres at the end of each period.

TABLE IV-19

Percent Reduction of Improved Wildlife Habitat Based on Acres of Non-Roaded Areas Becoming Roaded and Used for Human Activity

Alt.	Planning Periods 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	18	18	13	11	8	7
B	32	32	26	23	15	19
C	18	18	12	15	8	8
D	14	14	16	16	12	12
E	22	22	11	12	16	14
F	18	18	18	22	14	15
G	20	20	13	15	11	13
H	16	16	24	24	18	21

Acres of improved wildlife habitat that can be effectively utilized by wildlife species are shown in Table IV-20. Alternatives E and H provide the most improved habitat.

TABLE IV-20

Acres of Improved Wildlife Habitat that Can be Effectively Utilized (Thousand acres*)

	Planning Periods					
	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	447	574	677	655	558	582
B	462	591	740	819	661	690
C	426	534	625	588	536	547
D	454	573	606	555	518	546
E	473	643	873	973	851	935
F	461	603	708	734	733	683
G	434	555	648	609	538	584
H	490	653	774	844	857	812

*Figures shown are total acres at the end of each planning period.

The effect on wildlife when a Wilderness Study Area (WSA) is determined suitable or unsuitable for wilderness, is difficult to predict. The alternatives in which the respective WSA's are considered suitable for wilderness are: West Needle--Alternatives A, C, E, G, and H; Piedra--Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G. If the amount of use by humans increases dramatically, some impacts on wildlife and their use of the area is inevitable. Deer and elk use of an area as summer range and as a migration route would change.

Selection of a "suitable for wilderness" alternative would have little effect on most species presently inhabiting the area. Natural ecological diversity of land forms, geology and soil types provide for adequate vegetation composition diversity to fulfill habitat niches for the species present. Because of the amount and interspersion of drainage, moderately steep slopes, and rocky soils in the Wilderness Study Areas, large continuous areas of one vegetation type will not dominate the area. As a result, the present habitat niches will remain available. Opportunities to improve fish habitat would be precluded under the suitable alternative.

Selection of an "unsuitable for wilderness" alternative would allow activities such as timber harvesting and prescribed burning to be used to improve wildlife habitat. The opportunities to manage wildlife and fish habitat would increase.

Big Game Winter Range Carrying Capacity

In most alternatives, specific wildlife management prescriptions (E and F) have been applied to big game winter range areas. Table IV-21 displays the carrying capacity for deer and elk by planning periods for all alternatives. The major differences between alternatives result from a different number of acres allocated to these management prescriptions. All of the alternatives increase big game winter range carrying capacities. Alternatives B, H and E provide for the greatest increases.

TABLE IV-21

Big Game Winter Range Carrying Capacity (Thousand animals)

		Planning Periods					
Alt.	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	Deer-16.4	18.3	18.3	19.5	21.4	22.6	24.5
	Elk -12.8	13.4	13.4	13.8	14.4	14.8	15.4
B	Deer-16.4	24.9	24.9	26.5	30.8	32.3	36.6
	Elk -12.8	15.5	15.5	16.0	17.3	17.8	19.1
C	Deer-16.4	18.9	18.9	19.8	21.3	22.2	22.7
	Elk -12.8	13.6	13.6	13.9	14.4	14.7	15.1
D	Deer-16.4	18.6	18.6	19.2	20.3	20.9	22.0
	Elk -12.8	13.5	13.5	13.7	14.0	14.2	14.5
E	Deer-16.4	19.9	19.9	20.9	22.8	23.8	25.7
	Elk -12.8	13.9	13.9	14.2	14.8	15.1	15.7
F	Deer-16.4	18.0	18.0	18.3	18.9	19.2	19.8
	Elk -12.8	13.3	13.3	13.4	13.6	13.7	13.9
G	Deer-16.4	19.3	19.3	20.1	21.4	22.1	23.4
	Elk -12.8	13.7	13.7	13.9	14.3	14.5	14.9
H	Deer-16.4	19.4	19.4	21.7	23.8	25.1	27.2
	Elk -12.8	13.7	13.7	14.1	14.8	15.2	15.9

Cold Water Fish Habitat Improvement

The level of cold water fish habitat improvement is primarily a function of the philosophies of the alternatives. The miles of stream improvement planned for each alternative are shown in Table IV-22. Most of the cold water fish habitat improvement will occur in streams. Most of the lakes on the San Juan National Forest are within wilderness where improvement work is not compatible. Most of these lakes are of moderate to high quality based on their ecological condition.

TABLE IV-22

Miles of Annual Stream Improvement

Alternative	Average Annual Miles of Stream Improvement
A	7
B	2
C	5
D	0
E	8
F	5
G	2
H	5

Threatened and Endangered Species (T&E)

No direct T&E habitat improvement for either plant or animal species is planned in any alternative. However, all plant and animal T&E habitats are maintained and protected in present conditions under all alternatives through implementation of the Forest-wide Management Requirements.

Wildlife Habitat Diversity

The relative scarcity of seedlings and saplings is presently the factor most limiting to habitat diversity. The timber management activities of an alternative produce seedling and sapling age classes, which serve as a means of predicting an alternative's effect upon wildlife diversity. Another important factor in overall wildlife habitat diversity is the creation of uneven-age stands. These types of stands are vitally important to several groups of management indicator species. Table IV-23 summarizes how much each alternative produces of seedling-sapling and uneven-aged stands. Timber management applied under Alternative A produces the most acres of uneven-age timber stands. Alternative B has the least acres.

TABLE IV-23

Uneven-age Stand Production and Seedling-Sapling Structural Stage Production

	Percent of managed type in seedling-sapling structural stage at end of Planning Period 9 (2069).				Percent of timber in uneven-age management.
Alternative	Ponderosa Pine	Aspen	Douglas-Fir	Spruce Fir	
A	12.1	12.7	11.1	6.3	17.0
B	8.5	29.9	21.4	22.6	4.0
C	30.0	17.3	7.4	7.5	9.0
D	15.2	28.3	9.2	14.8	6.0
E	23.4	11.5	6.1	8.8	10.0
F	21.4	29.3	17.1	14.9	4.0
G	3.6	24.0	8.6	22.5	7.0
H	23.2	22.5	8.1	16.9	7.9

The long-term effects upon vegetation diversity, especially structural diversity, have been estimated by analyzing the acreage within the various management areas for each alternative. Structural diversity indirectly affects wildlife habitat diversity. Table IV-24 summarizes, by alternative, total management area acres which improve wildlife habitat diversity, total acres which improve diversity at optimum levels, total acres which allow diversity to occur under natural succession, and total acres where wildlife habitat diversity will decrease.

Wildlife and Fish Structures

Table IV-25 summarizes the average number of structures to be built annually for the improvement of fish and wildlife habitats. The number of structures varies by alternative, depending upon the acres of various management areas and the overall philosophy of each alternative.

TABLE IV-24

Wildlife Habitat Diversity (Thousand acres)

Category of Diversity	Alternatives A	B	C	D	E	F	G	H
Diversity Improved	632	902	532	759	819	1,056	731	889
Optimum Diversity	289	509	172	295	293	154	274	289
Natural Succession Diversity	1,235	690	1,201	868	1,031	783	905	932
Diversity Decreased	0	275	136	241	18	28	232	47

TABLE IV-25

Wildlife and Fish Structures

Alt.	Planning Periods 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	95	95	95	97	51	37
B	50	50	59	62	63	67
C	70	70	71	73	74	76
D	19	19	19	21	23	26
E	118	118	120	118	55	56
F	78	78	79	82	86	73
G	43	43	44	45	47	50
H	76	76	78	80	83	71

Alternative E calls for construction of the largest number of structures during the first five decades to bring fish habitat toward maximum potential in the least amount of time. Alternative A also plans for large numbers of structures for fish habitat improvement, but construction is at a slower rate. Alternatives B, C, G, and H plan for relatively few fish habitat improvement structures. No fish habitat improvement structures are planned in Alternative D.

Wildlife-Related Recreation

One of the main objectives of wildlife management is to provide wildlife-related recreation opportunities to users of the Forest. These activities, which are dependent on the availability of viable animal populations, include big game hunting, small game hunting, fishing, and various forms of non-game use. Table IV-26 displays estimates of use by time period for these four types of wildlife-related recreation.

RANGE

Livestock grazing on the San Juan National Forest will remain an important use under all alternatives. Alternative B, designed to favor market production, would increase authorized livestock grazing only slightly during the first decade, but the estimated increase would be 28 percent by the year 2030 (Table IV-27). Alternatives G and H approximate current use levels in the first decade, increasing more than 15 percent by 2030. Alternative A, which places the least emphasis on market outputs, reduces grazing in the first decade by 19 percent; from this level of 137,100 animal unit months (AUM's), use would increase only slightly during the planning period to 156,000 AUM's in 2030. Under Alternatives C, E, and F use drops below current use levels by 6 percent or less in the first decade, and then attains or exceeds current use in the second decade and beyond. Alternative D would decrease authorized livestock grazing by 10 percent in the first decade, and by 2030 it would have increased four percent above current levels.

The local livestock industry would be subjected to significant change under Alternative A and a moderate change under Alternative D in both the short and long-term use due to the reductions. The prescription applied to the management areas within each individual permittee's allotment management plan varies by alternative. Conceivably, some allotments would have few changes. Others could change greatly including reductions or increases in authorized AUM's.

Prescriptions emphasizing intensive timber, wildlife, visual, recreational, and archaeological management could result in reduction or preclusion of grazing for certain time periods. Acres closed to grazing range from 8,947 in Alternative A to 1,928 acres in Alternatives B, D, F, and G. The higher figure represents less than one-half percent of the total Forest acres.

Generally, intensive grazing practices, such as rest or deferred rotation, are more effective in improving range condition than season-long, extensive grazing practices. Alternative A specifies less than 30 percent of the available grazing acres under intensive grazing management (Table IV-28). The available grazing acres under intensive grazing management among the other alternatives ranges from 44 percent (Alternative D) to 59 percent (Alternative B). The time needed to improve range conditions on deteriorated ranges depends on both the level of authorized grazing use and the intensity of grazing management.

TABLE IV-26

Wildlife-Related Recreation Use by Time Period (Thousands of annnual recreation visitor days)

Alternative	Time Period	Activity			
		Big Game Hunting	Small Game Hunting	Fishing	Non-Game Use
Current	1980	92	16	137	10
A	1981-1990	142	25	209	15
	1991-2000	151	27	222	16
	2001-2010	160	29	235	17
	2011-2020	169	31	248	18
	2021-2030	178	33	261	19
B	1981-1990	142	25	209	15
	1991-2000	173	30	255	18
	2001-2010	204	35	301	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24
C	1981-1990	120	20	180	10
	1991-2000	139	23	209	11
	2001-2010	147	24	221	12
	2011-2020	156	25	234	13
	2021-2030	165	26	248	14
D	1981-1990	142	25	209	15
	1991-2000	173	30	255	18
	2001-2010	204	35	301	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24
E	1981-1990	142	25	209	15
	1991-2000	170	30	251	18
	2001-2010	200	35	296	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24
F	1981-1990	142	25	209	15
	1991-2000	173	30	255	18
	2001-2010	204	35	301	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24
G	1981-1990	142	25	209	15
	1991-2000	173	30	255	18
	2001-2010	204	35	301	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24
H	1981-1990	142	25	209	15
	1991-2000	173	30	255	18
	2001-2010	204	35	301	21
	2011-2020	226	39	334	23
	2021-2030	237	41	351	24

Under Alternative F, the "no action" Alternative, the conflict between reforestation for timber management and range allotments is not resolved. Alternatives B and G, with prescriptions that favor market outputs, would address conflicts between grazing, especially sheep, and dispersed recreation use, by reducing dispersed recreation opportunities in grazing areas. The other alternatives portray an array of domestic grazing outputs. The reduction is large in Alternative A, moderate in Alternative D and essentially the same as current use in all others for the first decade.

TABLE IV-27

Estimated Authorized Livestock Grazing (Thousand animal unit months per year)

	Alternative							
	A	B	C	D	E	F	G	H
1980 (170.2)								
1981-1990	137.1	171.6	163.8	152.6	166.6	168.6	174.1	169.5
1991-2000	149.1	188.6	182.8	173.6	185.6	187.1	193.1	190.8
2001-2010	154.1	198.6	185.8	173.6	183.6	187.1	193.1	194.1
2011-2020	153.1	208.6	189.8	175.6	190.6	192.1	198.1	197.6
2021-2030	156.1	218.6	191.8	176.8	195.6	195.1	198.1	200.2

TABLE IV-28

Estimated Livestock Grazing System Acres

	Alternative							
	A	B	C	D	E	F	G	H
Closed to Grazing	8,947	1,928	5,462	1,928	5,462	1,928	1,928	2,302
Extensive Grazing (Season-long)	1,345,427	758,041	890,002	1,040,904	881,786	815,210	778,588	772,583
Intensive Grazing (Rest or Deferred-Rotation)	513,408	1,107,813	972,318	824,950	980,534	1,050,644	1,087,266	1,092,897
Total	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782	1,867,782

Current livestock use and management activities would not change significantly in an alternative where a Wilderness Study Area (WSA) is determined suitable for wilderness. Manipulation of vegetation would be done in alternatives where WSA's are determined to be unsuitable for wilderness. This would result in increased livestock forage, especially in transitional range. This would require some additional fences and water developments to utilize the increased forage. The water developments would also benefit wildlife. In summary, neither a suitable or unsuitable alternative would significantly affect current livestock forage, but a suitable alternative would preclude the potential to increase range livestock forage. The alternatives in which the respective WSA's are considered suitable for wilderness are: West Needle--Alternatives A, C, E, G, and H; Piedra--Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G.

TIMBER

Determination of Lands Suitable for Timber Production

All San Juan National Forest lands were tested using the criteria for biologic capability, availability, and physical suitability for timber production. This resulted in 801,474 acres being identified as capable, available and tentatively suitable for timber production (See Chapter III, pages III-40 and III-41 for this determination).

From the tentatively suitable land, lands to be managed for timber production in each alternative were selected and classified as suitable lands. Lands not selected for timber production were classified as not suitable lands. Lands selected as suitable are a function of the alternative goals and objectives, so the number of suitable acres varies with each alternative. Table IV-29 displays the acres of land falling into the above categories under each alternative. Table IV-30 shows the distribution of these acres by species.

Timber Yield by Alternative

Timber yield (sale offering or volume) varies with each alternative. Differences in yields are mostly a function of the area suitable for timber production. Yield is also effected by silvicultural activity, but to a much lesser extent than the effect of suitable acres.

Long-term sustained yield is the maximum sustained yield which can be expected once the San Juan National Forest is fully managed. This is primarily a function of the amount and productivity of land suitable for timber production, and the prescription applied in a particular alternative. The long-term growth rate is computed by dividing the long-term sustained yield by the suitable acres. The long-term growth rate varies from 39 to 43 cubic feet per suitable acre per year.

Alternative A, with the least amount of suitable land, has the least annual and long-term sustained yield, and Alternative B, with the most suitable land, has the greatest yield. See Table IV-31 for details of this comparison.

TABLE IV-29

Alternative Distribution of Tentatively Suitable Land (Thousand acres)

	Alternative							
	A	B	C	D	E	F	G	H
Capable and Available	887.4	887.4	887.4	887.4	887.4	887.4	887.4	887.4
Not Technically Suitable	85.9	85.9	85.9	85.9	85.9	85.9	85.9	85.9
Capable, Available and Tentatively Suitable	801.5	801.5	801.5	801.5	801.5	801.5	801.5	801.5
Adjustments by: Wilderness Study Areas identified as unsuitable for wilderness designation								
Capable and Available	0	63.2	62.1	63.2	22.1	0	0	22.1
Not Technically Suitable	0	1.0	1.0	1.0	0	0	0	0
Tentatively Suitable	0	62.2	61.1	0	22.1	0	0	22.1
Total Adjusted Capable and Available	887.4	950.6	949.6	950.6	909.5	887.4	887.4	909.5
Not Suitable by:								
Technically Not Suitable	85.9	86.9	86.9	86.9	85.9	85.9	85.9	85.9
Timber Production Incompatible with Allocation	499.4	170.6	535.9	363.7	400.5	192.4	327.7	356.2
Total Not Suitable	585.3	257.5	622.8	450.7	486.4	278.3	413.6	442.1
Lands Suitable for Timber Production by Alternative	302.1	693.1	326.8	499.9	423.1	609.1	473.8	467.4

TABLE IV-30

Lands Available, Capable, and Suitable for Timber Production by Species (Thousand acres)

Alternative	Type	Capable and Available 1/	Not Suitable 2/	Suitable 3/
A	Pine	211.4	127.3	84.1
	Aspen	246.1	151.1	95.0
	Douglas-fir	123.5	92.3	31.2
	Spruce-fir	306.4	214.6	91.8
	Total	887.4	585.3	302.1
B	Pine	212.5	96.6	115.9
	Aspen	263.7	67.1	196.6
	Douglas-fir	146.1	26.2	119.9
	Spruce-fir	328.3	67.6	260.7
	Total	950.6	257.5	693.1
C	Pine	212.5	118.8	93.7
	Aspen	263.2	174.0	89.2
	Douglas-fir	146.1	104.3	41.8
	Spruce-fir	327.8	225.7	102.1
	Total	949.6	622.8	326.8
D	Pine	212.5	120.5	92.0
	Aspen	263.7	134.1	129.6
	Douglas-fir	146.1	67.3	78.8
	Spruce-fir	328.3	128.8	199.5
	Total	950.6	450.7	499.9
E	Pine	212.9	112.8	100.1
	Aspen	250.9	126.8	124.1
	Douglas-fir	125.7	71.5	54.2
	Spruce-fir	320.0	175.3	144.7
	Total	909.5	486.4	423.1
F	Pine	211.4	92.7	118.7
	Aspen	246.1	74.5	171.6
	Douglas-fir	123.5	17.8	105.7
	Spruce-fir	306.4	93.3	213.1
	Total	887.4	278.3	609.1
G	Pine	211.4	119.5	91.9
	Aspen	246.1	125.7	120.4
	Douglas-fir	123.5	58.8	64.7
	Spruce-fir	306.4	109.6	196.8
	Total	887.4	413.6	473.8
H	Pine	212.9	102.4	110.5
	Aspen	250.9	114.3	136.6
	Douglas-fir	125.7	54.9	70.8
	Spruce-fir	320.0	170.5	149.5
	Total	909.5	442.1	467.4

1/ Land capable of producing 20 cubic feet per acre per year which is not reserved or deferred. Capable and available after adjustments for Wilderness Study Areas when determined unsuitable for wilderness designation.

2/ Capable and available land which is not suitable for commercial timber production under the goals and objectives of the alternatives. (Includes technically not suitable.)

3/ Capable and available land which is suitable for timber production under the goals and objectives of the alternatives.

TABLE IV-31

Annual Timber Yield by Alternative

Alternative	Period	Annual Yield		Long-Term Sustained Yield	
		Million Cubic Feet	Million Board Feet 1/	Million Cubic Feet	Million Board Feet 1/
A	1981-1985	6.5	26.0		
	1986-1990	6.5	26.0		
	1991-2000	6.5	26.0		
	2001-2010	6.5	26.0		
	2011-2020	6.5	26.0		
	2021-2030	8.8	35.2	11.9	47.6
B	1981-1985	18.1	72.4		
	1986-1990	18.1	72.4		
	1991-2000	18.1	72.4		
	2001-2010	18.1	72.4		
	2011-2020	18.1	72.4		
	2021-2030	18.1	72.4	28.3	113.2
C	1981-1985	8.5	34.0		
	1986-1990	8.5	34.0		
	1991-2000	8.5	34.0		
	2001-2010	8.5	34.0		
	2011-2020	8.5	34.0		
	2021-2030	9.3	37.2	13.1	52.4
D	1981-1985	5.2	20.8		
	1986-1990	5.2	20.8		
	1991-2000	8.2	32.8		
	2001-2010	8.6	34.4		
	2011-2020	9.0	36.0		
	2021-2030	10.3	41.2	21.0	83.9
E	1981-1985	8.1	32.4		
	1986-1990	8.2	32.4		
	1991-2000	8.5	34.0		
	2001-2010	8.7	34.8		
	2011-2020	8.8	35.2		
	2021-2030	10.0	40.0	17.1	68.4
F	1981-1985	8.8	35.2		
	1986-1990	8.8	35.2		
	1991-2000	9.7	38.8		
	2001-2010	10.5	42.0		
	2011-2020	11.2	44.8		
	2021-2030	18.1	72.4	26.2	104.8
G	1981-1985	10.0	40.0		
	1986-1990	10.0	40.0		
	1991-2000	10.0	40.0		
	2001-2010	10.0	40.0		
	2011-2020	10.0	40.0		
	2021-2030	11.4	45.6	19.9	79.6
H	1981-1985	10.0	40.0		
	1986-1990	10.0	40.0		
	1991-2000	10.5	42.0		
	2001-2010	11.0	44.0		
	2011-2020	11.5	46.0		
	2021-2030	15.3	61.2	19.0	76.0

1/ Conversion of cubic foot (CF) to board foot (BF) volume (scribner): the ratio of BF/CF is a variable dependent on DBH class, tree height and species. The computed BF/CF ratios range from 2.4 BF/CF when thinning ponderosa pine from below to 5.1 BF/CF when making the overwood removal cut in the spruce-fir type. An average of 4 BF per 1 CF is used. The actual ratio will vary from alternative to alternative and from decade to decade within an alternative.

Figure IV-1 displays the base harvest schedules of the alternatives considered in detail over the next 200 years. For comparison purposes, the base harvest schedule of the benchmark that maximizes present net value by emphasizing market outputs (Benchmark #2) is also shown.

The alternatives where the various Wilderness Study Areas (WSA) are determined suitable for wilderness would have no potential for timber yield because timber cutting would be precluded in wilderness. The alternatives in which the respective WSA's are considered suitable for wilderness are: West Needle--Alternatives A, C, E, G, and H; Piedra-Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G. The potential timber yields foregone when the Wilderness Study Areas are considered suitable in an alternative are: West Needle--None; Piedra--6.0 million board feet; South San Juan Expansion--2.4 million board feet.

Harvest by Species by Period

Timber type distribution or species distribution is an important aspect of timber management. It is silviculturally desirable to bring each timber type under management as rapidly as possible. Species distribution is important from a milling and marketing viewpoint. Mills designed to manufacture spruce products cannot readily convert to the manufacturing aspen products. Mills which sell spruce may also have to locate new market outlets for aspen.

The present species distribution cut on the San Juan National Forest is approximately 40 percent pine, 40 percent spruce-fir and Douglas-fir, and 20 percent aspen. It would be desirable to maintain nearly the same mix in the future to serve existing mill capacity. Within an alternative, it would be desirable to maintain nearly the same species mix from period to period. As shown in Table IV-32, no alternative maintains the same species mix from period to period.

Age Class Distribution in The Year 2020

The age class distribution for the year 2020 is a reflection of how rapidly old growth stands are being replaced with young stands. For maximum timber production, it is desirable to remove old growth stands as rapidly as possible. It is also desirable silviculture to have an equal area in each age class (balanced age distribution) for each timber type. Such a forest configuration has lower losses to insect and disease mortality and has greater vigor than a forest with large areas in old growth condition.

At the end of 40 years, Alternative A shows the best progress towards balanced age distribution as indicated by the greatest portion of suitable land in the 10 to 40 year age class (34 percent) and Alternative F has the least (13 percent).

FIGURE IV-1

Base Harvest Schedule for Alternatives Considered in Detail and for the Benchmark Alternative

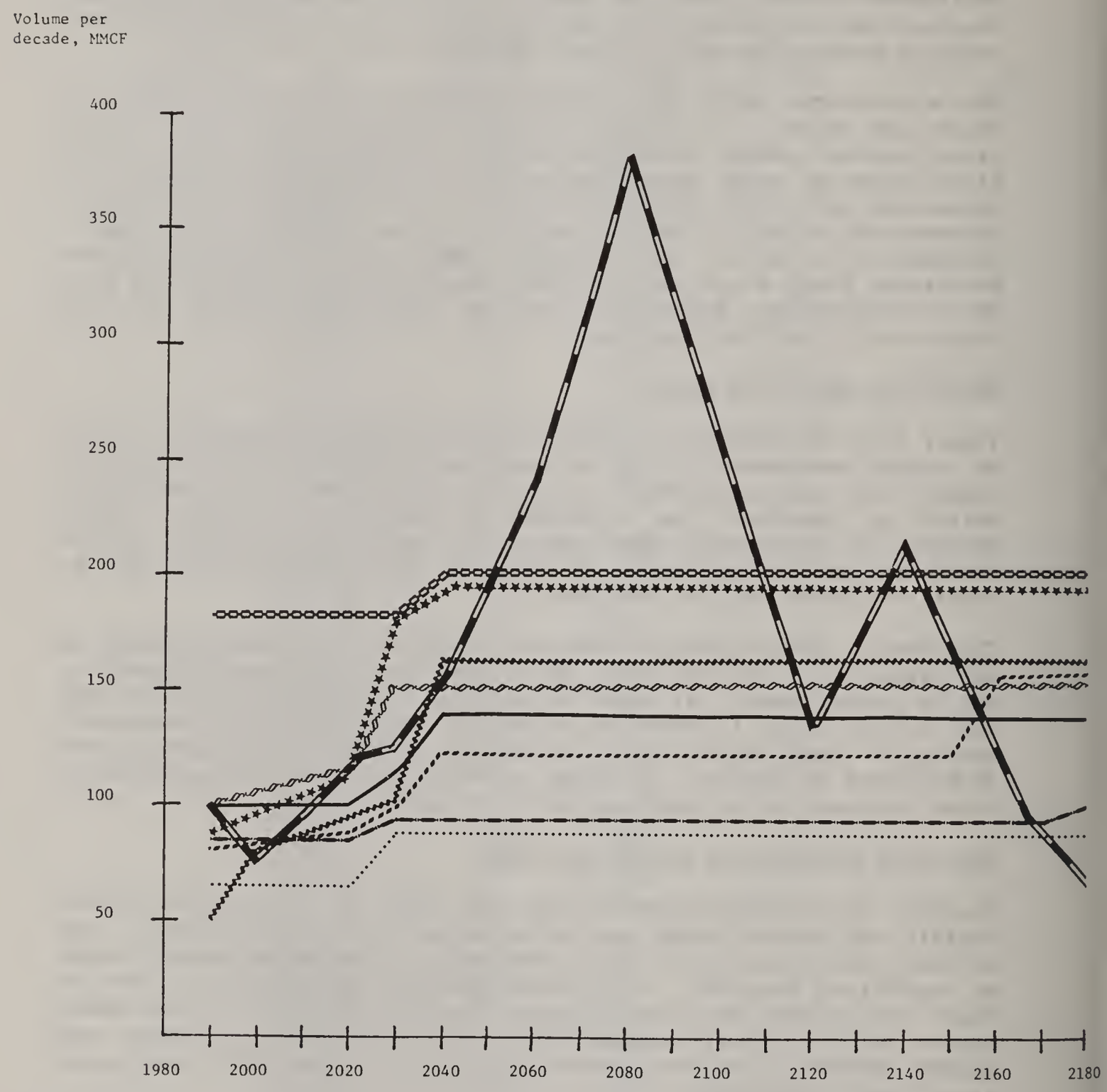


TABLE IV-32

Harvest Volume by Type by Period (Million cubic feet per year)

Alternative	Period	Species Pine	Aspen	Douglas-fir	Spruce-Fir	Total
A	1981-1985	2.05	1.96	0.32	2.17	6.50
	1986-1990	2.05	1.96	0.32	2.17	6.50
	1991-2000	1.80	1.47	0.35	2.88	6.50
	2001-2010	3.90	1.47	0.01	1.12	6.50
	2011-2020	0.58	3.61	0.00	2.31	6.50
	2021-2030	4.70	1.47	0.64	2.01	8.82
B	1981-1985	5.89	1.47	4.65	6.18	18.19
	1986-1990	5.89	1.47	4.65	6.18	18.19
	1991-2000	1.01	7.32	1.46	8.40	18.19
	2001-2010	3.64	1.47	2.97	10.11	18.19
	2011-2020	2.83	1.47	0.55	13.34	18.19
	2021-2030	9.27	1.47	1.61	5.84	18.19
C	1981-1985	1.31	1.47	0.77	4.95	8.50
	1986-1990	1.31	1.47	0.77	4.95	8.50
	1991-2000	2.04	1.68	1.04	3.74	8.50
	2001-2010	4.02	1.68	1.04	3.74	10.48
	2011-2020	0.44	1.47	0.00	6.59	8.50
	2021-2030	2.95	1.47	0.82	4.06	9.30
D	1981-1985	2.37	1.47	0.06	1.32	5.22
	1986-1990	2.37	1.47	0.06	1.32	5.22
	1991-2000	2.55	1.47	0.48	3.73	8.23
	2001-2010	1.40	1.47	0.64	5.11	8.62
	2011-2020	3.93	1.47	0.42	3.18	9.00
	2021-2030	3.30	1.47	0.53	5.04	10.34
E	1981-1985	2.50	1.47	1.10	3.08	8.15
	1986-1990	2.50	1.47	1.10	3.08	8.15
	1991-2000	1.71	1.47	0.06	5.26	8.50
	2001-2010	1.33	5.92	0.75	0.75	8.75
	2011-2020	3.34	3.65	1.51	0.25	8.75
	2021-2030	1.32	1.47	0.45	6.76	10.00
F	1981-1985	0.45	1.47	0.01	6.87	8.80
	1986-1990	0.45	1.47	0.01	6.87	8.80
	1991-2000	0.66	2.64	0.18	6.23	9.71
	2001-2010	4.59	3.88	1.53	0.50	10.50
	2011-2020	1.93	1.47	0.00	7.80	11.20
	2021-2030	3.71	1.47	0.28	12.61	18.07
G	1981-1985	3.07	1.47	0.01	5.45	10.00
	1986-1990	3.07	1.47	0.01	5.45	10.00
	1991-2000	2.35	1.47	1.81	4.37	10.00
	2001-2010	1.68	1.47	1.86	4.99	10.00
	2011-2020	1.75	1.47	0.00	6.78	10.00
	2021-2030	4.57	1.47	0.37	4.98	11.39
H	1981-1985	1.25	2.06	0.04	6.65	10.00
	1986-1990	1.25	2.06	0.04	6.65	10.00
	1991-2000	4.95	2.94	0.65	1.95	10.49
	2001-2010	3.02	2.94	2.83	2.21	11.00
	2011-2020	2.18	1.47	0.06	7.79	11.50
	2021-2030	7.70	1.47	0.88	5.25	15.30

In addition to a balanced age class distribution on all suitable land, it is desirable to obtain a balanced age class distribution in each timber type. Alternative A provides for 38 percent of the suitable pine type in 10 to 40-year age classes although it is not balanced because there are no acres in the 20-year age class. Alternative E provides for no pine acres in the 10 to 40-year age class. Considering balanced age classes in the pine type, Alternative A more nearly approaches a balance than any other alternative. Table IV-33 summarizes the age-class distribution by type in the year 2020.

Annual Acres Treated Silviculturally

Within any alternative, the acres treated varies as a result of the silviculture treatments applied from period to period. If the silvicultural treatment yields a high volume per acre, the number of acres treated in that period is relatively small. Thus, in Alternative A, 7,158 acres are treated in period 3 but only 5,185 acres are treated in period 4. In each period, the volume yield is the same.

The number of acres treated is also a function of the amount of suitable acres available for treatment. Alternatives with a small number of suitable acres also have a small number of treated acres. Table IV-34 displays the annual acres treated for each alternative.

Fuelwood

The supply of fuelwood consists of four categories: (1) non-commercial species such as Gambel oak, (2) unsalvaged natural mortality, (3) commercial species of unmerchantable size surplus to growing stock needs, and (4) unmerchantable portion of commercially harvested trees. Table IV-35 shows the supply of fuelwood, existing or to be created, by category, for each timber type. There is also some timber of merchantable size sold as merchantable sawtimber that is processed into fuelwood rather than lumber; however, this has not occurred in significant amounts and is not expected to occur in significant amounts in the next ten years. In 1979, approximately 20,000 cords of fuelwood were harvested from the San Juan National Forest, of which about 90 percent was harvested by individuals for personal use.

Accessibility is the key factor when considering the availability of fuelwood for personal use. Accessible fuelwood for personal use is defined as being within 200 feet of a travelway suitable for use by four-wheeled drive vehicles.

Table IV-36 displays the fuelwood supply as a result of applying the sum of the weighted average cords per acre in categories 1, 2, and 3 to the "Suitable" acres shown in Table IV-29 for each alternative. Also displayed is the "accessible fuelwood supply" for personal use as a result of applying the sum of the weighted average cords per acre in categories 1, 3, and 4 to the "Annual Acres Treated" for the first ten years in Table IV-34 for each alternative. This tabulation provides comparison of total supply available and accessible for each alternative.

TABLE IV-33

Age Class Distribution by Timber Type in Year 2020 (Thousand acres)

Alt.	Type	Age Class in Years 10	20	30	40	50*	60	120	160	Total
A	Pine	14.7	-	17.1	-	-	-	-	52.3	84.1
	Aspen	22.6	9.2	9.2	12.2	-	14.5	27.2	-	94.9
	Douglas-fir	0.1	0.1	1.4	1.2	-	0.4	0.5	27.5	31.2
	Spruce-fir	7.7	1.7	-	4.8	-	9.6	1.3	66.7	91.8
	Total	45.1	11.0	27.7	18.2	-	24.6	29.0	146.5	302.1
B	Pine	36.4	7.2	-	-	-	-	-	72.3	115.9
	Aspen	9.2	9.2	45.7	9.2	-	24.4	98.9	-	196.6
	Douglas-fir	0.2	-	8.4	17.0	-	0.4	2.0	91.9	119.9
	Spruce-fir	20.6	5.2	19.5	21.5	-	13.8	5.9	174.2	260.7
	Total	66.4	21.6	73.6	47.7	-	38.6	106.8	338.4	693.1
C	Pine	4.9	-	1.7	-	-	-	-	87.1	93.7
	Aspen	9.2	12.6	10.5	9.2	-	13.6	34.1	-	89.2
	Douglas-fir	0.3	-	4.5	2.8	-	-	0.8	33.4	41.8
	Spruce-fir	16.8	2.8	4.0	5.5	-	10.4	1.9	60.7	102.1
	Total	31.2	15.4	20.7	17.5	-	24.0	36.8	181.2	326.8
D	Pine	27.7	-	-	-	-	-	-	64.3	92.0
	Aspen	9.2	9.2	9.2	9.1	-	16.9	76.0	-	129.6
	Douglas-fir	0.9	-	0.1	1.6	-	-	1.3	74.9	78.8
	Spruce-fir	1.2	-	-	8.2	-	13.1	4.4	172.6	199.5
	Total	39.0	9.2	9.3	18.9	-	30.0	81.7	311.8	499.9
E	Pine	-	-	-	-	-	-	-	100.1	100.1
	Aspen	22.8	37.0	9.2	9.2	-	16.4	29.5	-	124.1
	Douglas-fir	6.0	-	1.4	7.7	-	0.4	0.7	38.0	54.2
	Spruce-fir	6.2	1.9	-	12.6	-	12.8	1.1	110.1	144.7
	Total	35.0	38.9	10.6	29.5	-	29.6	31.3	248.2	423.1
F	Pine	4.6	-	1.8	-	-	-	-	112.3	118.7
	Aspen	9.2	24.3	16.4	9.2	-	20.8	91.7	-	171.6
	Douglas-fir	-	-	0.5	2.4	-	0.4	4.1	98.3	105.7
	Spruce-fir	0.5	0.5	0.3	9.5	-	15.3	3.1	183.9	213.1
	Total	14.3	24.8	19.0	21.1	-	36.5	98.9	394.5	609.1
G	Pine	0.8	-	2.4	-	-	-	-	88.7	91.9
	Aspen	9.2	9.2	9.2	9.2	-	16.9	66.7	-	120.4
	Douglas-fir	-	3.2	4.1	1.6	-	-	1.0	54.8	64.7
	Spruce-fir	6.9	1.8	3.8	9.0	-	13.1	3.3	158.9	196.8
	Total	16.9	14.2	19.5	19.8	-	30.0	71.0	302.4	473.8
H	Pine	3.1	4.4	16.7	0	-	0	0	86.3	110.5
	Aspen	9.2	18.4	18.4	12.9	-	18.9	58.8	0	136.6
	Douglas-fir	0	13.3	1.0	1.2	-	0.4	1.5	53.4	70.8
	Spruce-fir	4.2	1.2	1.5	7.4	-	14.2	2.1	118.9	149.5
	Total	16.5	37.6	21.5	33.5	-	33.5	62.4	258.6	463.6

*There are no age class acres listed at 50 years in the year 2020 because, for calculation purposes, all seedling-sappling trees were lumped into the 20 year age class in the 1980 data base. In reality, there would be a certain amount of acres in the 50-year class at year 2020.

TABLE IV-34

Annual Acres Treated Silviculturally

Alternative	Period	Inter-mediate[1/]	Clear Cut[2/]	Shelterwood[3/]	Selection[4/]	Total
A	1981-1985	1,641	1,350	2,811	1,864	7,666
	1986-1990	1,641	1,350	2,811	1,864	7,666
	1991-2000	4,484	937	1,315	1,229	7,965
	2001-2010	2,122	919	4,117	--	7,158
	2011-2020	31	2,257	1,033	1,864	5,185
	2021-2030	3,865	918	1,615	1,229	7,627
B	1981-1985	8,694	3,589	872	1,159	14,314
	1986-1990	8,694	3,589	872	1,159	14,314
	1990-2000	1,387	7,222	1,451	37	10,097
	2001-2010	12,355	1,172	4,077	124	17,728
	2011-2020	2,017	2,674	1,602	1,370	7,663
	2021-2030	1,887	1,644	10,701	41	14,273
C	1981-1985	3,588	1,277	1,296	--	6,161
	1986-1990	3,588	1,277	1,296	--	6,161
	1991-2000	2,826	1,806	1,469	1,527	7,628
	2001-2010	7,322	1,279	1,501	397	10,499
	2011-2020	2,276	1,794	454	41	4,565
	2020-2030	2,934	1,105	2,177	1,558	7,774
D	1981-1985	3,421	918	--	1,883	6,222
	1986-1990	3,421	918	--	1,883	6,222
	1991-2000	5,613	919	--	--	6,532
	2001-2010	5,430	919	1,378	--	7,727
	2011-2020	4,567	1,133	1,557	2,027	9,284
	2021-2030	3,907	918	3,598	--	8,423
E	1981-1985	3,314	2,163	858	--	6,335
	1986-1990	3,314	2,163	858	--	6,335
	1991-2000	3,684	918	722	2,256	7,580
	2001-2010	4,514	3,719	512	--	8,745
	2011-2020	4,938	2,996	38	116	8,088
	2021-2030	6,327	918	178	2,271	9,694
F	1981-1985	4,705	918	107	884	6,614
	1986-1990	4,705	918	107	884	6,614
	1991-2000	4,042	1,709	281	270	6,302
	2001-2010	9,788	2,425	517	60	12,790
	2011-2020	3,343	925	3,048	884	8,200
	2021-2030	6,584	918	5,953	282	13,737
G	1981-1985	6,321	996	504	1,317	9,138
	1986-1990	6,321	996	504	1,317	9,138
	1991-2000	3,496	1,701	913	833	6,943
	2001-2010	7,076	1,357	775	8	9,216
	2011-2020	4,245	1,175	1,413	1,352	8,185
	2021-2030	6,310	918	3,344	838	11,410
H	1981-1985	3,932	1,285	2,171	1,732	9,120
	1986-1990	3,932	1,285	2,171	1,732	9,120
	1991-2000	8,181	2,084	1,003	134	11,402
	2001-2010	3,013	3,191	2,458	204	8,866
	2011-2020	5,550	918	2,786	1,732	10,986
	2021-2030	1,257	918	7,632	155	9,962

1/ Intermediate cuts - all entries into the stand prior to the regeneration cuts

2/ Clear cut - a regeneration cut

3/ Shelterwood - a regeneration system, includes preparatory, seed, and removal cuts

4/ Selection - uneven-age management

TABLE IV-35

Supply of Fuelwood, Existing or to be Created, by Category, for each Timber Type (Cords per acre)

Timber Type	Category 1	2	3	4	Total
Pine	.5	1.0	2.0	2.0	5.5
Aspen	--	2.0	4.0	2.0	8.0
Douglas-fir	--	2.0	2.0	3.0	7.0
Spruce-fir	--	4.0	3.0	4.0	11.0
Total	.5	9.0	11.0	11.0	31.5
Weighted Average	.1	2.4	2.9	2.8	8.2

TABLE IV-36

Summary of Supply of Fuelwood

Alternative	Supply From Suitable Acres (Thousand Cords)	Accessible Supply from Annual Acres Treated Thousand Cords/Year
A	1,631	44.5
B	3,742	83.0
C	1,765	35.7
D	2,732	36.1
E	2,284	36.7
F	3,289	38.4
G	2,558	53.0
H	2,524	52.9

Reforestation

Each alternative has areas of presently non-stocked lands which are classified as suitable for timber production. These lands are considered to be the reforestation backlog and are located in the Douglas-fir and spruce-fir types. Non-stocked areas in the ponderosa pine type are classified as not suitable for timber production because of the inability to assure adequate regeneration within five years [36 CFR 219.13(h)(3)]. See Appendix L for a discussion of regeneration problems in presently non-stocked ponderosa pine type areas.

The respective acreage of the reforestation backlog in each alternative would be reforested by the end of 1985. The backlog to be eliminated by 1985 is as follows:

Alternative	Reforestation Backlog Acres
A	4,761
B	11,804
C	4,742
D	9,839
E	7,807
F	11,830
G	9,839
H	8,515

Reforestation is also made necessary through timber harvest and natural catastrophies such as fire. In order to better ensure regeneration of harvested conifer stands, some seedbed preparation will be done at the time of the regeneration cut. If natural regeneration is not expected to occur or does not occur, the stand will be planted. No work is planned in aspen stands following harvest, as natural regeneration occurs readily in this type.

The amount of reforestation activity varies with each alternative, and is a function of the number of suitable acres and the silvicultural treatment of these acres. Alternatives which allow regeneration cuts in the conifer types have relatively high reforestation activity and alternatives which provide intermediate cuts in the conifer types have low reforestation activity. Table IV-37 summarizes the acres of reforestation made necessary by timber harvest for all alternatives.

Timber Stand Improvement

Timber stand improvement (TSI) activities are undertaken to increase the growth rate, improve the quality of timber, maintain desirable species composition, prevent insect and disease attacks, and generally maintain vigorous tree stands.

TSI activities are considered commercial if the products can be sold, or non-commercial if the products cannot be sold. This section deals with non-commercial activities. Non-commercial TSI is commonly referred to as pre-commercial TSI because non-commercial TSI activities are frequently performed in stands of less than commercial (salable) size.

Non-commercial TSI activities are divided into two categories: 1) backlog and 2) current. Backlog TSI refers to the accumulation of untreated stands in need of some type of TSI activity. Analysis of the available

TABLE IV-37

Reforestation Made Necessary by Timber Harvest (Thousand acres - annual)

Alternative	Time Period	Site Preparation	Planting	Total
A	1981-1985	2.0	0.9	2.9
	1986-1990	2.0	0.9	2.9
	1991-2000	0.3	0.0	0.3
	2001-2010	2.2	0.7	2.9
	2011-2020	1.0	0.4	1.4
	2021-2030	0.0	0.0	0.0
B	1981-1985	2.8	1.9	4.7
	1986-1990	2.8	1.9	4.7
	1991-2000	3.3	2.7	6.0
	2001-2010	4.2	2.0	6.2
	2011-2020	1.8	1.7	3.5
	2021-2030	6.0	3.0	9.0
C	1981-1985	5.0	2.5	7.5
	1986-1990	5.0	2.5	7.5
	1991-2000	1.1	0.6	1.7
	2001-2010	1.3	0.3	1.6
	2011-2020	1.0	0.9	1.9
	2021-2030	1.4	0.8	2.2
D	1981-1985	0.0	0.0	0.0
	1986-1990	0.0	0.0	0.0
	1991-2000	0.0	0.0	0.0
	2001-2010	1.4	0.7	2.1
	2011-2020	1.6	0.9	2.5
	2021-2030	1.6	0.9	2.5
E	1981-1985	1.4	0.9	2.3
	1986-1990	1.4	0.9	2.3
	1991-2000	0.2	0.0	0.2
	2001-2010	0.5	0.0	0.5
	2011-2020	0.1	0.1	0.2
	2021-2030	0.0	0.0	0.0
F	1981-1985	0.0	0.0	0.0
	1986-1990	0.0	0.0	0.0
	1991-2000	0.1	0.1	0.2
	2001-2010	0.5	0.2	0.7
	2011-2020	0.0	0.0	0.0
	2021-2030	2.3	1.1	3.4
G	1981-1985	0.1	0.0	0.1
	1986-1990	0.1	0.0	0.1
	1991-2000	0.8	0.6	1.4
	2001-2010	1.0	0.3	1.3
	2021-2020	0.4	0.3	0.7
	2021-2030	1.9	0.9	2.8
H	1981-1985	1.7	0.8	2.5
	1986-1990	1.7	0.8	2.5
	1991-2000	0.8	0.4	1.2
	2001-2010	2.0	0.8	2.8
	2011-2020	0.1	0	0.1
	2021-2030	4.1	2.0	6.1

data indicates that there is no backlog of non-commercial TSI treatment. There are stands in need of treatment; however, these stands are of commercial size and the desired TSI treatment should be done via commercial timber sale. Because every stand on the Forest has not been surveyed on-the-ground there may be a minor amount of backlog TSI which will be revealed as individual stands are surveyed.

Current TSI needs are a result of the normal growth of stands. These TSI needs will be addressed as they occur so that backlogs do not accumulate. The only current non-commercial TSI treatment anticipated is release and weeding in ponderosa pine stands to reduce competition from understory vegetation. Ponderosa pine stands will receive a prescribed fire once every ten years except for the first 30 years following the regeneration harvest. Additional current TSI needs may be revealed as individual stand surveys are completed.

The number of acres treated varies by alternative. Variations are a function of the suitable acres of pine type and the regeneration of these stands. Table IV-38 summarizes the acres of TSI for each alternative.

TABLE IV-38

Annual Timber Stand Improvement (Thousand acres)

	Alternative							
Period	A	B	C	D	E	F	G	H
1981-1985	6.7	11.5	9.4	9.2	10.0	11.9	9.2	9.4
1986-1990	6.7	11.5	9.4	9.2	10.0	11.9	9.2	9.4
1991-2000	6.7	10.9	9.4	9.2	10.0	11.9	9.2	8.9
2001-2010	5.3	7.2	8.9	7.8	10.0	11.4	9.1	8.7
2011-2020	6.3	7.2	8.9	6.4	10.0	11.4	9.1	8.7
2021-2030	6.3	3.1	7.7	4.9	10.0	9.1	7.3	6.4

WATER

Water yield would increase under all alternatives. Activities which reduce vegetation (primarily small clearcuts) or increase snow redistribution into openings (small clearcuts and snow fences) increase water yield. The degree of water yield improvement depends on the size, elevation, aspect, and topographic positioning of the clearcut openings

or snow fences. Activities which increase vegetation, such as reforestation and road obliteration, tend to reduce water yield. Increases in water yield shown in Table IV-39 are due primarily to clearcuts.

TABLE IV-39

Increase in Water Yield and Sediment

Alternative	Through 1990				Through 2030			
	Increase in Water Yield (acre-feet/year)		Increase in Sediment (tons/year)		Increase in Water Yield (acre-feet/year)		Increase in Sediment (tons/year)	
	over baseline	over existing yield	over baseline	over existing yield	over baseline	over existing yield	over baseline	over existing yield
A	27,890	5,050	6,156	-157	43,186	20,346	6,759	466
B	48,139	25,299	8,383	2,070	106,112	83,272	14,376	8,063
C	28,450	5,610	7,937	1,624	56,340	33,550	9,414	3,101
D	27,790	4,950	6,027	-286	37,713	16,873	6,987	674
E	30,850	8,010	5,777	-536	60,590	37,750	8,248	1,935
F	27,920	5,080	6,212	-101	47,111	24,271	8,152	1,839
G	28,338	5,498	6,189	-124	44,641	21,801	7,374	1,061
H	29,998	7,158	6,292	-21	46,665	23,825	7,516	1,203

Baseline water yield is the average annual amount the San Juan National Forest would produce in pristine condition (no roads, timber removal, power lines, etc.) which is about 2.47 million acre-feet per year. Short-term water yield increases (through 1990) vary by about 5,000 acre-feet per year for Alternatives A, C, D, F, and G to about 25,000 acre-feet for the high market Alternative B. Long-term water yield increases (through the year 2030) range from about 17,000 acre-feet per year for Alternative D to over 83,000 acre-feet for Alternative B. Over the 50 year planning period, cumulative water yield increases range from 595,000 acre-feet in Alternative D to 3,250,000 acre-feet in Alternative B.

Baseline (natural condition) sediment yield is estimated at 195,000 tons/year. The sediment amounts in Table IV-39 are based on the estimated changes in sediment yield due to the amount of roads and additional channel scour from water yield increases. These estimations do not include potential sediment reduction from improved road maintenance, watershed restoration projects, and range improvement projects.

Short-term sediment reduction (through the year 1990) in Alternatives A, D, E, F, G and H are due to more road obliteration than construction in the first time period. Long-term sediment yield increases vary from 674 tons/year for Alternative D to 8,063 tons/year for Alternative B.

In most alternatives, timber harvests would be located and scheduled to keep sediment yield within acceptable levels (threshold limits) in all watersheds. For example, no clearcuts will occur until the 4th or 5th time periods in critical watersheds currently in violation of sediment thresholds. This will allow degraded channel conditions and sediment yield to improve to within acceptable limits. Some violations of watershed sediment thresholds would occur in Alternative B due to the large number of roads and clearcuts. Water meeting quality goals would increase slightly through the planning periods for all alternatives except for Alternative B.

Water quality would be expected to improve slightly as the condition of range allotments improve and as buffer filter strip standards in riparian areas are established and maintained. Chemical water quality will improve if mine acid drainage problems are corrected in the Animas and Dolores Rivers. Extensive mineral development, however, could result in additional chemical water quality degradation.

The water yield, water quality, and potential sediment for each alternative are shown in Table IV-40.

The determination of the Wilderness Study Areas (WSA) as suitable or unsuitable for wilderness in any of the alternatives would have no appreciable effect on water quantity. Piedra and South San Juan Wilderness Expansion have some potential for water yield increase; 975 and 1,417 acre-feet per year respectively. In alternatives where these WSA's are identified as suitable for wilderness (Piedra--Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G), this potential would be foregone. Some water quality change, primarily increased sediment and turbidity, would occur in the Piedra and South San Juan Wilderness Expansion if these areas were roaded. Water quality would be maintained by applying the Forest-wide Management Requirements.

MINERALS

Demand for mineral exploration and development opportunities, particularly for gold, silver, and energy minerals, is expected to increase significantly regardless of the management alternative applied to the San Juan National Forest. All mineral exploration and development activities will be conducted in a timely process in accordance with applicable laws and regulations under any alternative. Refinement and improvement of procedures to protect surface resources, while permitting exploration for and extraction of mineral resources, will be emphasized.

TABLE IV-40

Average Annual Water, Sediment Yield, Water Quality Effects

Improved Water Yield	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
	Thousand Acre-Feet				
Alternative A	5.05	8.35	16.05	19.8	20.34
B	25.29	67.97	70.79	78.95	83.27
C	5.61	12.45	17.81	29.65	33.55
D	4.95	9.53	12.95	15.21	16.87
E	8.01	11.21	31.04	40.03	37.75
F	5.08	13.26	24.87	25.00	24.27
G	5.49	13.48	18.78	23.24	21.80
H	7.64	16.25	25.22	25.42	23.92
	Million Acre-Feet				
Water Yield	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternative A	2.500	2.503	2.511	2.515	2.515
B	2.520	2.563	2.566	2.574	2.578
C	2.501	2.507	2.513	2.525	2.529
D	2.500	2.505	2.507	2.510	2.512
E	2.503	2.506	2.526	2.535	2.533
F	2.500	2.508	2.520	2.520	2.519
G	2.501	2.508	2.514	2.518	2.517
H	2.503	2.511	2.520	2.520	2.519
	Tons				
Total Potential Sediment	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternative A	199,947	200,288	201,091	200,680	200,570
B	202,174	206,516	207,345	207,657	208,168
C	201,728	202,307	202,776	202,028	203,205
D	199,818	201,020	201,498	201,990	200,778
E	199,567	200,326	202,193	202,323	202,039
F	200,003	201,026	202,559	202,005	201,943
G	199,980	200,798	201,539	201,173	201,165
H	200,082	201,096	202,577	201,461	201,307
	Million Acre Feet				
Water Meeting Quality Goals	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
Alternative A	1.85	1.85	1.89	1.89	1.89
B	1.85	1.81	1.78	1.74	1.71
C	1.85	1.85	1.89	1.89	1.89
D	1.85	1.85	1.89	1.89	1.89
E	1.85	1.85	1.89	1.89	1.89
F	1.85	1.85	1.89	1.89	1.89
G	1.85	1.85	1.89	1.89	1.89
H	1.85	1.85	1.89	1.89	1.89

Recommendations for availability of lands for mineral leasing are based on criteria which reflect the degree of surface protection appropriate to each area. Within designated wildernesses and Wilderness Study Areas, only those lands which can be restored to near-natural conditions are recommended for leasing with surface occupancy. Special areas, such as research natural areas and archaeological areas, are recommended for leasing without allowing any surface occupancy, since disturbance of the surface resource would damage the characteristics of the land which makes it special. For all unclassified Forest lands, mineral leasing with surface occupancy is recommended where reclamation to the planned use is possible following abandonment of the operation.

Table IV-41 shows the availability of the total San Juan National Forest lands for minerals leasing by alternative. Table IV-42 shows this information for non-wilderness and other unclassified lands on the Forest. Additional tables are discussed and referenced later in this section which show this information for wildernesses and Wilderness Study Areas.

Non-wilderness National Forest Lands

Operating plans will include provisions to minimize adverse environmental impacts on surface resources. Reasonable conditions will be imposed which generally will not interfere with proposed operations. These conditions do not vary significantly among management alternatives for non-wilderness Forest lands.

Without actual knowledge of proposed mineral activity, direct or indirect effects cannot be accurately estimated. Such effects require a case-by-case analysis prior to approval of operating plans.

Some temporary impacts can be expected from minerals exploration, regardless of the alternative implemented. These impacts may include road or trail construction for access, vegetation disturbance during exploration or development, reduced air quality, reduced water quality, and disturbance of wildlife. Environmental assessments for specific projects will consider the protection of surface resources in accordance with the Forest-wide Management Requirements established in the Forest Plan.

Major impacts of mineral activity can be expected under all alternatives. The following activities are expected:

Dolores Ranger District - carbon dioxide, natural gas, and oil exploration, production, and construction of transmission facilities; uranium, precious and base metal exploration, mining, and placer activity.

Mancos Ranger District - oil and natural gas exploration and production and construction of transmission facilities; precious and base metal exploration, mining, and placer activity.

Animas Ranger District - uranium, precious and base metal exploration and mining activity.

TABLE IV-41

Mineral Leasing Recommendations for Total San Juan National Forest Lands

Leasing Availability Recommendations	A		B		C		D		E		F		G		H	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
No Lease	324,228	17	263,058	14	293,294	16	263,063	14	302,200	16	470,777	25	305,229	16	302,130	16
Lease	1,269,980	68	1,426,665	76	1,313,118	70	1,417,660	76	1,355,356	73	1,257,679	67	1,352,593	72	1,342,926	72
Lease without Surface Occupancy	273,574	15	178,059	10	261,370	14	187,149	10	210,226	11	139,326	8	209,960	12	222,726	12
Total Forest	1,867,782	100	1,867,782	100	1,867,782	100	1,867,782	100	1,867,782	100	1,867,782	100	1,867,782	100	1,867,782	100

TABLE IV-42

Mineral Leasing Recommendations for Non-wilderness and Other Unclassified Lands, San Juan National Forest

Leasing Availability Recommendations	A		B*		C*		D*		E*		F		G		H*	
	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
No Lease	29,599	2	13,087	1	30,815	2	12,960	1	21,039	2	19,805	1	12,960	1	20,007	1
Lease	1,192,605	86	1,367,802	92	1,254,255	86	1,358,797	92	1,289,438	90	1,,257,679	90	1,275,218	91	1,277,008	90
Lease without Surface Occupancy	167,626	12	100,908	7	180,553	12	110,040	7	115,638	8	116,205	9	105,511	8	129,100	9
Total for Area	1,389,830	100	1,481,797	100	1,465,623	100	1,481,797	100	1,426,115	100	1,393,689	100	1,393,689	100	1,426,115	100

*Acreage includes Wilderness Study Areas identified as unsuitable for wilderness in these alternatives

Pine Ranger District - natural gas and oil exploration, production, and construction of transmission facilities; uranium exploration; coal exploration and mining activity.

Pagosa Ranger District - oil and natural gas exploration, production, and construction of transmission facilities; precious and base metal exploration and mining activity; coal exploration and mining activity.

Each management alternative affects mineral related activity in different ways and to different degrees. Effects may be considered as conflicts due to other land uses or resource values. These conflicts arise generally through either social, physical or biological factors. Major factors and the type of mineral activity most strongly affected are:

SOCIAL FACTOR	AFFECTED MINERAL ACTIVITY
Recreation	Exploration (locatable and leasable minerals), mining (locatable minerals), field development (leasable minerals)
Cultural/Historical	Surface mining (locatable and leasable minerals), field development (leasable minerals)
PHYSICAL FACTOR	
Road Density	Exploration (locatable and leasable minerals), other phases less severely affected
Visual Quality	Mining (locatable minerals), field development (leasable minerals)
Watershed	Mining, field development and abandonment or restoration phases of all mineral activity

Managing areas for semi-primitive motorized, non-motorized and dispersed recreation may foster conflicts by bringing visitors into contact with mineral activities. Such contacts may be abrupt and could generate negative feelings about authorized mineral-resource uses.

Important cultural and historical resources may constrain or even prevent development of mineral resources by imposing costly mitigation measures, or by requiring relocation of planned facilities. Some unique areas may be withdrawn completely or partially from mineral entry.

High road density facilitates mineral exploration and, to a lesser degree, mineral development, and allows it to proceed faster with less

expense than does low road density. Management of National Forest System land for timber sales and other activities which support road construction is highly compatible with mineral activity.

Strong emphasis on maintaining visual quality affects all phases of mineral development which require ground disturbance on a moderate to large scale. Management prescriptions which emphasize visual quality restrict mineral development by requiring such measures as vegetation screens, dispersed or buried facilities, and unobtrusive structures.

Protection of the watershed affects both development and abandonment of mineral facilities. Management areas which require enhancement of watershed quality impose strict control of mine wastewater, mill tailings, waste liquids, open pit mine location, and construction of well pad facilities. During abandonment, reclamation measures are required to control soil erosion and contamination of the watershed, including filling, contouring, and revegetation.

Each alternative may be ranked or rated regarding the impact of the factors described above on all mineral-related activities as follows:

ALTERNATIVE	RATING
A	Generally incompatible with mineral activity
B	High compatibility with mineral activity
C	Generally incompatible with mineral activity
D	Generally compatible with mineral activity
E	Marginally compatible with mineral activity
F	Maximum compatibility with mineral activity
G	Marginally compatible with mineral activity
H	Generally compatible with mineral activity

The availability for minerals leasing on non-wilderness lands is displayed by alternative in Table IV-42.

Research Natural Areas

Under all alternatives, the designation of research natural areas requires an evaluation of the desirability of withdrawing these areas from minerals location and leasing. The effects of withdrawal by alternative are summarized in Table IV-43.

Wilderness

Protection of and restoration of disturbance to the biological and physical resources of wilderness will be emphasized in all alternatives. Effects of mineral exploration and development will not change by alternatives and may range from short-term restorable impacts of geophysical

TABLE IV-43

Mineral Withdrawal Acreages By Management Alternative

	A		B		C		D		E		F		G		H	
AREAS TO BE WITHDRAWN FROM MINERAL LOCATION AND LEASING ON DECEMBER 31, 1983																
Existing Wilderness Areas (San Juan National Forest)	360,684		360,684		360,684		360,684		360,684		360,684		360,684		360,684	
	Locatable	Leasable														
High/Mod. Mineral Potential[1/]	109,760	6,000	109,760	6,000	109,760	6,000	109,760	6,000	109,760	6,000	109,760	6,000	109,760	6,000	109,760	6,000
Wilderness Study Areas[2/]	90,100		0		15,800		0		57,300		90,100		90,100		57,300	
High/Mod. Mineral Potential[1/]	27,427	17,082	--	--	14,430	0	--	--	15,340	1,450	27,427	17,082	27,427	17,082	15,340	1,450
Total Area (Wilderness)	450,784		360,684		376,484		360,684		417,984		450,784		450,784		417,984	
High/Mod. Mineral Potential[1/]	137,187	23,082	109,760	6,000	124,190	6,000	109,760	6,000	125,000	7,450	137,187	23,082	137,187	23,082	125,100	7,450
AREAS TO BE EVALUATED FOR WITHDRAWAL FROM MINERAL LOCATION (SPECIAL AREAS)																
Total Area	7,522		3,788		4,162		3,788		4,162		3,788		3,788		4,162	
High/Mod. Mineral Potential[1/]	1,700	N/A	1,700	N/A	2,074	N/A	1,700	N/A	2,074	N/A	1,700	N/A	1,700	N/A	2,074	N/A

1/ Lands identified as having moderate to high potential for the occurrence of economically recoverable mineral resources. These resources are classified as either locatable or leasable minerals; the acreages shown (the first column under each alternative is locatable; the second is leasable) for each classification of minerals may overlap. Remaining wilderness and special area lands have a low or unknown mineral potential.

2/ If Congress designates all study areas as wilderness under the 1964 Wilderness Act, these designated areas will be withdrawn from mineral location and leasing on December 31, 1983. If no Congressional designation occurs, these areas will remain open to mineral location and leasing.

exploration and exploratory drilling to long-term restorable impacts of full mineral development programs. Surface-use limitations for mineral leases and operating plans will follow Forest-wide Management Requirements in the Forest Direction section of the Forest Plan.

The Wilderness Act of 1964 provides that, subject to valid rights then existing, on December 31, 1983 the minerals in lands designated as wilderness will be withdrawn from all forms of appropriation under the mining laws and from disposition under all laws pertaining to minerals leasing. This pending wilderness mineral withdrawal, subject to valid rights then existing, will result in the mineral withdrawal of some lands evaluated as having moderate to high mineral potential. Table IV-43 displays the mineral withdrawal acreage by alternative.

Because all of the wildernesses encompass portions of adjacent Forests, the management of the Lizard Head Wilderness is jointly shared with the Uncompahgre National Forest as are the Weminuche and South San Juan Wildernesses with the Rio Grande National Forest. The availability of wildernesses for minerals leasing is relatively constant under all alternatives except Alternative F. Table IV-44 displays by wilderness the availability of these lands for minerals leasing. A more detailed display which includes the distribution of these lands by Forest for each wilderness is included in Appendix M.

Wilderness Study Areas

Table IV-45 displays by Wilderness Study Area and alternative the availability of these lands for minerals leasing.

HUMAN AND COMMUNITY DEVELOPMENT

Implementation of any of the alternatives provides an opportunity to contribute to human and community development programs. These include activities that provide youth with resource conservation work and related learning experiences. Examples of these activities include the Youth Conservation Corps (YCC) and the Young Adult Conservation Corps (YACC). Adult employment and training programs, such as the Senior Community Service Employment Program and the Comprehensive Employment Training Act, are also provided. These programs help ensure equal employment opportunities for women, minorities, the elderly, and the handicapped.

These programs are affected by budgetary restrictions rather than resource management alternatives of the Forest Plan; therefore, the effects were estimated to be similar for all alternatives.

In addition to the programs that would be provided in all the alternatives, the San Juan National Forest will continue to conduct the volunteers in the National Forests program that provides opportunities for persons to contribute their talents and knowledge to enhance Forest Service activities. The Forest will also participate in cooperative programs administered by State and local governments.

TABLE IV-44

Minerals Leasing Recommendations for Designated Wildernesses

Area and Forest	Leasing Availability Recommendations	Alternatives A		B		C		D		E		F		G		H	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
Entire South San Juan Wilderness (San Juan and Rio Grande National Forests)	No Lease	101,903	76	98,698	74	99,755	75	98,830	74	98,830	74	133,643	100	101,903	76	99,755	75
	Lease	3,745	3	3,745	3	3,745	3	3,745	3	3,745	3	0	0	3,745	3	3,745	3
	Lease without Surface Occupancy	27,815	21	31,020	23	29,963	22	30,888	23	30,888	23	0	0	27,815	21	29,963	22
	Total for Area	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100
Entire Weminuche Wilderness (San Juan and Rio Grande National Forests)	No Lease	317,036	68	316,100	68	317,036	68	316,100	68	316,629	68	463,224	100	316,100	68	317,036	68
	Lease	59,860	13	59,860	13	59,860	13	59,860	13	59,860	13	0	0	59,860	13	59,860	13
	Lease without Surface Occupancy	86,328	19	87,264	19	86,328	19	87,264	19	86,735	19	0	0	87,264	19	86,328	19
	Total for Area	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100
Entire Lizard Head Wilderness (San Juan and Uncompahgre National Forests)	No Lease	15,749	40	15,749	40	15,749	40	15,749	40	15,749	40	40,000	100	15,749	40	15,749	40
	Lease	10,534	26	10,534	26	10,534	26	10,534	26	10,534	26	0	0	10,534	26	10,534	26
	Lease without Surface Occupancy	13,717	34	13,717	34	13,717	34	13,717	34	13,717	34	0	0	13,717	34	13,717	34
	Total for Area	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100
Total South San Juan, Weminuche and Lizard Head Wildernesses	No Lease	434,688	68	430,547	67	432,540	68	430,679	67	431,208	67	636,687	100	433,752	68	432,540	68
	Lease	74,139	12	74,139	12	74,139	12	74,139	12	74,139	12	0	0	74,139	12	74,139	12
	Lease without Surface Occupancy	127,860	20	132,001	21	130,008	20	131,869	21	131,340	21	0	0	128,796	20	130,008	20
	Total for Area	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100

TABLE IV-45

Minerals Leasing Recommendations for Wilderness Study Areas, San Juan National Forest

Study Area	Leasing Availability	A Acres	%	B* Acres	%	C* Acres	%	D* Acres	%	E* Acres	%	F Acres	%	G Acres	%	H* Acres	%
South San Juan (Montezuma Peak)	No Lease	7,395	62	(77)	(1)	(513)	(4)	(77)	(1)	(77)	(1)	11,946	100	7,395	62	(513)	(4)
	Lease	642	5	(10,540)	(88)	(7,440)	(62)	(10,540)	(88)	(10,540)	(88)	0	0	642	5	(7,440)	(62)
	Lease without Surface Occupancy	3,909	33	(1,329)	(11)	(3,993)	(34)	(1,329)	(11)	(1,329)	(11)	0	0	3,909	33	(3,993)	(34)
	Total for Area	11,946	100	(11,946)	(100)	(11,946)	(100)	(11,946)	(100)	(11,946)	(100)	11,946	100	11,946	100	(11,946)	(100)
South San Juan (V-Rock Trail)	No Lease	1,539	7	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(20,854)	(100)	1,539	7	(0)	(0)
	Lease	10,815	52	(20,578)	(99)	(20,578)	(99)	(20,578)	(99)	(20,578)	(99)	(0)	(0)	10,815	52	(20,578)	(99)
	Lease without Surface Occupancy	8,500	41	(276)	(1)	(276)	(1)	(276)	(1)	(276)	(1)	0	0	8,500	41	(276)	(1)
	Total for Area	20,854	100	(20,854)	(100)	(20,854)	(100)	(20,854)	(100)	(20,854)	(100)	20,854	100	20,854	100	(20,854)	(100)
Entire South San Juan Wilderness Expansion Study Area	No Lease	8,934	27	(77)	(1)	(513)	(2)	(77)	(1)	(77)	(1)	32,800	100	8,934	27	(513)	(2)
	Lease	11,457	35	(31,118)	(95)	(28,018)	(85)	(31,118)	(95)	(31,118)	(95)	0	0	11,457	35	(28,018)	(85)
	Lease without Surface Occupancy	12,409	38	(1,605)	(4)	(4,269)	(13)	(1,605)	(4)	(1,605)	(4)	0	0	12,409	38	(4,269)	(13)
	Total for Area	32,800	100	(32,800)	(100)	(32,800)	(100)	(32,800)	(100)	(32,800)	(100)	32,800	100	32,800	100	(32,800)	(100)
Piedra	No Lease	20,114	48	(0)	(0)	(0)	(0)	(0)	(0)	20,114	48	41,500	100	20,114	48	20,114	48
	Lease	7,055	17	(36,734)	(89)	(36,734)	(89)	(36,734)	(89)	7,055	17	0	0	7,055	17	7,055	17
	Lease without Surface Occupancy	14,331	35	(4,766)	(11)	(4,766)	(11)	(4,766)	(11)	14,331	35	0	0	14,331	35	14,331	35
	Total for Area	41,500	100	(41,500)	(100)	(41,500)	(100)	(41,500)	(100)	41,500	100	41,500	100	41,500	100	41,500	100

TABLE IV-45 (Continued)

Minerals Leasing Recommendations for Wilderness Study Areas, San Juan National Forest

Study Area	Leasing Availability	A Acres	%	B* Acres	%	C* Acres	%	D* Acres	%	E* Acres	%	F Acres	%	G Acres	%	H* Acres	%
West Needle	No Lease	10,415	66	(0)	(0)	10,415	66	(0)	(0)	10,415	66	15,800	100	10,415	66	10,415	66
	Lease	0	0	(15,800)	(100)	0	0	(15,800)	(100)	0	0	0	0	0	0	0	0
	Lease without Surface Occupancy	5,385	34	(0)	(0)	5,385	34	(0)	(0)	5,385	34	0	0	5,385	34	5,385	34
	Total for Area	15,800	100	(15,800)	(100)	15,800	100	(15,800)	(100)	15,800	100	15,800	100	15,800	100	15,800	100
Total Wilderness Study Areas	No Lease	39,463	43	77	1	10,928	12	77	1	30,606	34	90,100	100	39,463	43	31,042	34
	Lease	18,512	21	83,652	93	64,752	72	83,652	93	38,173	42	0	0	18,512	21	35,073	39
	Lease without Surface Occupancy	32,125	36	6,371	7	14,420	16	6,371	7	21,321	24	0	0	32,125	36	23,985	27
	Total for Area	90,100	100	90,100	100	90,100	100	90,100	100	90,100	100	90,100	100	90,100	100	90,100	100

* Acres and percentages in brackets indicate Wilderness Study Areas which are identified as unsuitable for wilderness in these alternatives.

LANDS

Lands related actions will be directly influenced by the budget of each alternative. As budgets increase and program market output is increased, need for support from the lands program is also increased. Lands program outputs are shown in Table IV-46.

Land purchase and acquisition for all alternatives except E indicate a relatively consistent program. Alternative E has a much higher rate of purchase and acquisition, consistent with the Proposed Rocky Mountain Regional Plan.

Land exchanges would remain at the current level of 250 to 500 acres per year for all alternatives, except B and E. Alternatives B and E would increase land exchange to between 750 and 1000 acres per year. This increase would attain the goal of obtaining the 37,500 to 40,000 acres of desired exchange lands.

The right-of-way acquisition program will remain relatively steady for all alternatives, initiating 2 to 4 cases per year.

As the surveying program for land line location progresses, more encroachments on the San Juan National Forest will be identified. Alternative E would identify the highest number of occupancy trespass cases and would have the highest case workload.

There are an estimated 3,200 miles of land line requiring survey on the San Juan National Forest. Alternative E would eliminate the backlog of land line to be located by the year 2000. This backlog is defined as 50 percent of land line location needed. The remainder would be completed by the year 2020. Alternatives B, C and F would eliminate the backlog by the year 2030. Alternative H would eliminate the backlog by the year 2020. Alternatives A, D, and G would not eliminate the backlog within the planning period.

SOILS

The effects of an alternative on the soil resource include both direct and indirect effects, depending on soil capability and the activities involved. Cutting trees results in indirect effects whereas road construction results in direct effects. Effects can be either beneficial or adverse; the latter of which, if not mitigated, may result in a permanent loss in soil productivity.

There are few ways to actually quantify the adverse consequences of management activities on the soil resource. The quantification of potential erosion rates, based on the amount of disturbance to the vegetation cover, was used as a method for comparing alternatives. The Universal Soil Loss Equation (USLE) was used to estimate and evaluate potential erosion resulting from each alternative. The numbers produced by the USLE vary among alternatives as a function of the intensity and size of disturbances. These numbers are relative values used to indicate differences in alternatives and should not be considered as absolute erosion rates.

TABLE IV-46

Lands Program

Land Purchase & Acquisition	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
				Total Acres by Time Period			
Alternative A	0	400	400	800	800	800	800
B	0	800	800	1,600	1,600	1,600	1,600
C	0	500	500	1,000	1,000	1,000	1,000
D	0	400	400	800	800	800	800
E	0	12,520	5,650	--	--	--	--
F	0	400	400	800	800	800	800
G	0	400	400	800	800	800	800
H	0	500	500	1,000	1,000	1,000	1,000

Land Exchange Offered	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
				Total Acres by Time Period			
Alternative A	0	1,250	1,250	2,500	2,500	2,500	2,500
B	0	5,000	5,000	10,000	10,000	5,000	5,000
C	0	2,500	2,500	5,000	5,000	2,500	2,500
D	0	1,250	1,250	2,500	2,500	2,500	2,500
E	0	3,750	3,750	7,500	7,500	7,500	7,500
F	0	1,250	1,250	2,500	2,500	2,500	2,500
G	0	1,250	1,250	2,500	2,500	2,500	2,500
H	0	2,500	2,500	5,000	5,000	2,500	2,500

Right-of-Way Acquisition	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
				Total Number of Cases by Time Period			
Alternative A	4	10	10	20	20	20	20
B	4	20	20	40	40	20	20
C	4	15	15	30	30	30	15
D	4	10	10	20	20	20	20
E	4	20	20	40	40	20	20
F	4	15	15	30	30	30	15
G	4	10	10	20	20	20	20
H	4	15	15	30	30	30	15

Occupancy Trespass	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
				Total Number of Cases by Time Period			
Alternative A	2	15	15	30	30	30	30
B	2	30	30	60	60	60	60
C	2	20	20	40	40	40	40
D	2	10	10	20	20	20	20
E	2	40	40	80	80	80	80
F	2	15	15	30	30	30	30
G	2	10	10	20	20	20	20
H	2	20	20	40	40	40	40

Land Line Location	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
				Total Number of Miles by Time Period			
Alternative A	29	148	130	260	260	260	260
B	29	302	320	640	640	640	640
C	29	164	150	300	300	300	300
D	29	150	150	150	150	150	150
E	29	425	425	850	850	850	0
F	29	160	145	290	290	290	290
G	29	148	130	260	260	260	260
H	29	225	225	450	450	450	450

Potential erosion rates shown in the following summary, when analyzed over the erodible acres on the San Juan National Forest, fall below the average tolerable loss limits for all alternatives. The average erosion tolerance limit for known soils on the Forest is 3.23 tons per acre per year.

Potential Erosion - 50-Year Average (Tons/acre/year)

	Alternatives							
1980	A	B	C	D	E	F	G	H
.239	.172	.334	.154	.291	.251	.270	.269	.227

For comparison purposes, Alternative F is nearest the current level of management and has a Forest-wide erosion potential of .270 tons per acre per year. Alternative B has the highest erosion potential. This is because more acres are disturbed by management activities under this alternative.

The soils would not be significantly affected directly by the determination of a Wilderness Study Area being suitable or unsuitable in any alternative. Increased potential for erosion in the unsuitable alternatives could impact the soils within project areas. Mitigation measures would be used to reduce this impact to acceptable levels.

Activities which may potentially compact the soil to undesirable levels will occur under all alternatives. However, freezing, thawing, wetting and drying the soils should restore suitable soil structures over time and not significantly affect soil productivity below acceptable levels.

Certain management practices disturb the soil more than others. For example, road, trail and facility construction, and some fire suppression activities cause soil erosion which temporarily exceeds tolerable limits in the immediate area of disturbance. This is usually a short-term effect lasting only until the disturbance stabilizes. Road construction produces the greatest amount of on-site erosion even though the total amount of road acres is small.

Forest-wide Management Requirements related to soils were designed to follow the "Best Management Practices" concept. This concept is one of matching management practices to the capability of the land, along with appropriate mitigation measures necessary to minimize the impact. For the most part, sites tend to heal or revegetate naturally. This, in conjunction with mitigation, will reduce soil loss.

Soil erosion would not significantly reduce short-term or long-term productivity if the Forest-wide Management Requirements are followed. These specify that restoration and rehabilitation begin within the year of termination of the disturbance. On-site soil erosion is detrimental if transported directly into lakes or streams.

Management areas with emphasis on range and wildlife have been identified as having the potential for improving watershed conditions. Watershed conditions will be improved through road obliteration activities, special riparian management, along with range and wildlife betterment work. The following summary shows planned acres per year by alternative, for the 50-year period, that will undergo watershed improvement.

Average Annual Acres of Watershed Improvement (50 years)

	Alternatives							
*Current	A	B	C	D	E	F	G	H
60.0	88.5	67.5	74.1	21.4	134.7	27.6	21.4	60.0

*Current is the average number of acres considered treated annually in the last 10-year period. It is mainly road obliteration projects.

Roads and trails are land areas that are essentially out of production and unavailable for other use. The acres allocated to these land uses for each alternative are as follows:

Acres in Roads and Trails (50-year average)

	Alternatives							
1980	A	B	C	D	E	F	G	H
6,733	5,031	6,609	5,048	6,783	5,204	6,266	6,372	5,607

FACILITIES

The San Juan National Forest transportation system is directly affected by what management emphasis is placed on an area accessed by a road or trail. The direct effect is primarily on the local road system, (e.g.,

a road built to access a specific area within a timber sale or one to a campground.) This direct effect can result from increasing the density of roads within a timber harvest area; on the other hand, the road system density can be reduced if a semi-primitive motorized recreation emphasis is placed on the same area.

Direct effects on the Forest collector and arterial road system will primarily result from reconstruction of existing system roads. Some new construction will occur to access relatively unroaded areas if the particular allocation requires this type of road.

Road construction, in turn, affects other resources, such as timber, soils, water, and wildlife habitat. Such effects are discussed in the appropriate sections elsewhere. Road construction, reconstruction, obliteration, and maintenance affect costs of National Forest management. These costs are described in the economic portion of this document.

Table IV-47 shows the relationship of total road miles constructed or reconstructed, most of which are local roads, to the cumulative volume of wood harvested for the 50-year planning period. This summary shows generally higher road work necessary for higher wood volume harvested.

All alternatives contain areas having emphases on range, recreation, water, and minimum management areas, all with no planned timber harvesting activities. Historically, these emphases have resulted in little or no road construction or reconstruction activities; however, the need for access still exists. Road activities will primarily consist of road reconstruction with minimal new road construction. The amount of area allocated to these emphases generally affects the amount of road work needed. Total road work for the 50-year planning period by alternative is shown on Table IV-47.

TABLE IV-47

50-Year Road Construction/Reconstruction

Alternative	Timber Associated				Other Resource Areas w/No Timber Harvest		Total Construction/ Reconstruction for 50 Years**
	Million Cubic Feet	Miles** Constructed	Miles** Reconstructed	Total	Area* Thousand Acres	Miles Reconst.	
A	348	443	1,140	1,583	799	290	1,873
B	948	1,452	1,851	3,303	499	255	3,558
C	477	557	1,176	1,733	918	290	2,023
D	414	623	1,464	2,087	709	275	2,362
E	441	710	1,233	1,943	663	305	2,248
F	582	902	1,972	2,874	381	250	3,124
G	514	678	1,632	2,310	653	275	2,585
H	583	770	1,377	2,147	588	280	2,427

* Area excludes wilderness, research natural areas, and other special emphasis areas having little or no roads.

** Arterial and collector road construction or reconstruction represents about 35 percent of the figures shown.

The road system will be managed through specific management objectives and traffic regulations. Management of one road may consist of closing the road to public use while management of another road might consist of allowing public use year round. Different methods of management affect the way in which a road is maintained. Road maintenance is classified according to five levels. Each level includes an objective for travel management. A brief description of each level follows:

Level 1 - Roads are not open to traffic; they are maintained to protect the road investment and its surrounding resources.

Level 2 - Roads are open to a limited type of traffic such as administrative use, permitted use, specialized traffic, or a combination of these.

Level 3 - Roads are open to public, but may be seasonally closed.

Level 4 - Roads are open to public, usually year round, and user riding comfort is considered.

Level 5 - Roads are open and safe for travel in passenger cars. The most consideration for user comfort occurs at this level.

Projected maintenance levels are shown in Table IV-48 for each alternative. Each projected level remains within a similar range from one alternative to another. Current mileage and maintenance are from existing inventory figures. Due to budget limitations, those levels shown do not reflect actual maintenance level percentages. The second "Current" line shows percentage estimates based on actual maintenance level activities due to present budget constraints.

As shown in Table IV-49, travel management in each alternative will include a significant amount of road closures as reflected by the percentages shown in maintenance level one. Additional seasonal closures will be necessary in all alternatives to prevent resource damage or damage to the roadbed.

Trail system management is directly affected by the area allocated to various management emphases. A higher market output emphasis generally results in fewer trail system miles. A lower emphasis on market outputs results in more trail system miles. The current inventoried mileage is near the amount indicated for Alternatives A and C.

Table IV-49 shows total acres in wilderness, special areas, and semi-primitive non-motorized allocations with miles of trail, by alternative:

The proposed Continental Divide National Scenic Trail (CDNST) is managed similarly in each alternative. Most of the trail corridor in the San Juan National Forest passes through wilderness, and its management is

TABLE IV-48

Projected Maintenance Levels

Alternatives	Mile Maintenance per Year (Ave.Over 50-Years)	% of Miles by Classification			% of Miles by Maintenance Levels				
		Arterials and Collectors	Local Constants	Intermittent	1	2	3	4	5
Current	2,218	35	54	11	10* 40**	39* 42**	28* 15**	18* 3**	5*
A	2,232	48	15	37	35	33	26	6	0
B	2,533	35	20	45	40	25	31	4	0
C	1,981	48	15	37	31	38	26	5	0
D	2,307	33	22	45	41	33	23	3	0
E	2,205	40	18	42	37	36	24	3	0
F	2,469	37	21	42	37	41	20	2	0
G	2,312	37	21	42	37	41	20	2	0
H	2,302	40	20	40	33	27	27	3	0

* Maintenance based on current inventory.

**Maintenance estimate for actual maintenance budget.

TABLE IV-49

Area of Non-market Emphasis and Trail System Miles

Alternative	Non-market Emphasis Area (Thousand Acres)	Miles of Trail
1980 Inventory		1,153
A	1,144	1,250
B	684	750
C	1,075	1,000
D	858	850
E	945	950
F	732	800
G	895	900
H	902	900

compatible with wilderness management. Both inside and outside the wilderness, development and management of the trail will be according to Forest-wide Management Requirements which are integrated into the prescription for the management areas through which the trail passes.

Table IV-50 illustrates the area of existing low road density outside of wilderness and the changes resulting from each alternative. Generally, the road density of an area is determined by the emphasis of the alternative and the management prescriptions applied. The higher the emphasis on market outputs, the more area eventually removed from low road density designation.

TABLE IV-50

Road Density Comparison

Alternative	Existing Low* Density Area (Thousand Acres)	Proposed Area Changed to Roaded (Thousand Acres)	Area Remaining w/Low Roads (Thousand Acres)
A	849	124	725
B	933	450	483
C	929	131	798
D	933	296	637
E	874	206	668
F	849	356	493
G	849	268	581
H	873	233	640

*Low implies an area having 0 to 1.0 miles per section of land outside of wilderness.

Each alternative will have effects in terms of total miles of road to be removed from the transportation system (See Table IV-51). Roads will be removed from the transportation system through obliteration (returned to production) when the facility will no longer be used or planned as a travelway or put-to-bed (stabilized) when use is not planned for an extended period of time. Obliteration may include a minor amount of restoration where the area of land occupied by the road would be returned to original contours. The amount will be decided on a project

by project basis, and is a function of the prescription being applied. In all alternatives, road obliteration during the first decade is at high levels. Except for Alternatives B and C, total road miles affected remain at fairly constant levels.

TABLE IV-51

Miles of Road Obliterated or Put-to-bed (Stabilized)

Alternative	Time Period 1982-1990	1991-2000	2001-2010	2011-2020	2021-2030	Total
A	431	121	54	63	25	694
B	733	189	45	13	63	1,043
C	719	131	124	48	47	1,069
D	445	111	25	31	31	643
E	579	89	110	109	29	916
F	425	65	84	28	38	640
G	505	94	47	24	40	710
H	494	186	86	30	37	833

PROTECTION

Air Quality

Air quality is affected by activities such as vehicular travel on dusty roads. However, the only planned activity to have significant effect on air quality is prescribed fire. Use of prescribed fire will have short-term adverse effects on air quality, primarily visibility impairment. Table IV-52 shows the amount of prescribed fire planned by alternative.

Class I and Class II standards of the Clean Air Act Amendments of 1977 will be met under each alternative.

That portion of the Weminuche Wilderness which was designated as Wilderness prior to 1977 is Class I. Additions to the Weminuche after 1977, along with the remainder of the Forest, are Class II. Wilderness values are to be protected from adverse effects from air pollution in Class I areas. A moderate degradation over baseline concentrations of air pollutants is allowed in Class II areas.

The alternatives where Wilderness Study Areas are determined suitable or unsuitable for wilderness designation should have no appreciable effects on air quality. Current conditions should be maintained under any alternative.

Negative effects on air quality will be minimized by restricting the use of prescribed fire to times when smoke dispersal and burning conditions are most compatible with meteorological conditions. Additional requirements are included in the Forest-wide Management Requirements.

Fire

The risk of fire ignitions will increase under all alternatives as more people use the San Juan Forest. However, this increase in risk can be mitigated to tolerable levels through fuel treatment and fire prevention programs.

Fuel loadings will be reduced primarily through the use of prescribed fire. In addition, fuels will be removed through the increasing public demand for fuelwood and by increasing commercial fuelwood sales. Under all alternatives, activities to minimize losses to wildfire will include appropriate suppression action on all wildfires and extensive use of prescribed fires from planned as well as unplanned ignitions as a management tool. The extent to which prescribed fire will be used varies by alternative as shown in Table IV-52.

TABLE IV-52

Average Annual Acreage Treated by Prescribed Fire (Thousand acres)

	Time Periods				
Alternative	1981-1990	1991-2000	2001-2010	2011-2020	2021-2030
A	12.5	11.1	10.8	10.4	11.8
B	26.0	18.4	21.4	14.7	17.3
C	15.0	13.5	14.5	13.0	13.3
D	12.5	11.1	11.1	8.3	8.2
E	21.0	17.7	20.7	17.7	20.7
F	16.2	15.2	15.7	14.7	13.4
G	14.4	12.3	14.3	12.2	12.5
H	18.2	15.2	17.5	14.5	15.4

There is a significant difference between alternatives in the number of acres planned for treatment by prescribed fire. This is directly related to the total number of acres placed under intensive management. Prescribed fire from unplanned ignitions will be used in wilderness and semi-primitive areas to maintain certain natural ecosystems. This acreage is not included in the above display.

Intensities of wildfires will be lower when fires occur within areas managed with prescribed fire. Although there are differences in the area of the San Juan National Forest treated with prescribed fire under the various alternatives, the effect upon the total fire protection program between alternatives is not significant.

In the alternatives where Wilderness Study Areas (WSA's) are determined suitable for wilderness there would be a minimal effect on wildfire occurrence over the short term. Over the long-term, wildfire occurrence and intensity would probably be increased due to the natural accumulation of ground fuels. The alternatives in which the respective WSA's are considered suitable for wilderness are: West Needle--Alternatives A, C, E, G, and H; Piedra--Alternatives A, E, G, and H; South San Juan Wilderness Expansion--Alternatives A and G. Opportunities to reduce ground fuels by timber harvesting and prescribed burning would be provided in alternatives where WSA's are identified as unsuitable for wilderness. The increased use by man primarily through timber, wildlife habitat, and recreation activities, could increase the occurrence of wildfire.

Integrated Pest Management

Prevention of insect and disease infestations, usually through cultural or mechanical means, is the long-range pest management objective on the San Juan National Forest. Population buildups will be monitored, and if potential epidemics are identified, ground surveys will be made. If determined to be serious, suppression measures will be taken to control populations until reduced to an endemic stage.

Cultural or mechanical means of prevention are usually accomplished through vegetation manipulation activities associated with the long-term management of timber, range and wildlife. Practices include thinning, harvesting, and utilization in timber management; and utilization, revegetation, mechanical chopping and raking, and prescribed fire in range and wildlife management.

Forest-wide Management Requirements provide for monitoring insect infestations and disease outbreaks through aerial surveys and ground checking. Integrated pest management prevention and suppression are applied to the San Juan National Forest under all alternatives. Monitoring needs are most intense under the alternatives having the least vegetation manipulation such as alternatives A, C, D, and G.

Timber harvesting is an efficient and effective method of preventing or suppressing insect and disease infestation and buildup. Planned harvesting reduces stands to stocking levels which are less susceptible to infestation. It also serves as an effective prevention or control method by removing infested or low vigor trees from the Forest. For comparison purposes, the following table provides information on expected mortality on land that is available and capable for timber production but does not have planned timber sales because of other resource objectives.

	Alternatives							
	A	B	C	D	E	F	G	H
Timber Producing Lands Determined Not Suitable Because of Other Resource Objectives (Thousand Acres)	499	171	536	364	400	192	328	356
Annual Mortality Expected (Million Board Feet)	29	10	32	21	24	11	19	21

ECONOMIC AND SOCIAL EFFECTS

ECONOMIC EFFICIENCY

The planning process specified in the NFMA regulations requires consideration of economic efficiency as a basic principle of planning [36 CFR 219.1(b)(13)], in the formulation of alternatives [36 CFR 219.5(f)(1)(v)], in estimating the effects of alternatives [36 CFR 219.5(g)(9)], and in evaluating the alternatives [36 CFR 219.5(h)].

In addition to the NFMA requirements, the Congressionally revised Resources Planning Act Statement of Policy states that "...forests and rangeland, in all ownerships, should be managed to maximize their net social and economic contributions to the Nation's well being, in an environmentally sound manner...." Further, "The Secretary of Agriculture shall continue his efforts to evaluate the cost-effectiveness of the renewable resource program." The application of the Forest-wide Management Requirements to all alternatives ensures that multiple use management will be applied "in an environmentally sound manner."

The main criterion used in the efficiency analysis is present net value, which is defined as discounted benefits less discounted costs, including only those outputs to which monetary values can be assigned. In the linear programming model, FORPLAN, each alternative was originally run to maximize present net value over five decades. This ensured that the original tentative allocation for each alternative was composed of the most cost-efficient set of management prescriptions. When FORPLAN had more than one option, all of which satisfied the constraints to at least a certain extent, it would select the most economically efficient prescription. This, combined with the fact that all prescriptions are composed of the most cost-efficient set of practices to achieve the desired ends, allows the conclusion that each alternative is an economically efficient allocation, given the philosophy and constraints that were imposed.

The best alternative is the one that maximizes net public benefit, which is defined as the overall value to the Nation of all benefits less all associated inputs and costs, regardless of whether or not they can be

quantitatively valued. The economic parameters shown in the tables included in this section reflect only the monetary portion of the analysis used to evaluate alternatives. This is further discussed in the following section entitled "Resource Values."

An incremental analysis was conducted to show the additional costs necessary to provide outputs, goods, and services for each alternative above those derived from minimum level management. The Minimum Level Benchmark (No. 1) is a baseline alternative which was eliminated from further study. It represents the set of minimum unavoidable activities mandated solely by virtue of public land ownership. The only significant outputs of minimum level management are dispersed recreation use and water yield. There are no outputs for developed recreation, grazing use, or timber production. The only costs are those associated with protecting the life, health, and safety of incidental National Forest users, preventing impairment of the productivity of land, and protecting adjacent lands. Although eliminated from further study, the minimum level benchmark does provide a base for comparing the incremental costs and benefits of those alternatives analyzed in detail. This ensures that the economic parameters being used in evaluation of alternatives are the result of a true incremental analysis in which "fixed" benefits and costs are not a factor.

The relative economic efficiency of each alternative is summarized in Tables IV-53 and IV-54. Table IV-53 displays various undiscounted benefits and costs by decade by alternative. Included in this table are estimates of non-Forest Service costs that would be incurred under each alternative to realize the benefits associated with Forest outputs. These estimates include non-Forest Service expenditures of range permittees, county road maintenance, and cooperative wildlife programs.

Benefits in Table IV-53 are of two types: Federal receipts and "assigned values less receipts." Federal receipts are those monies received by the Forest Service that flow directly into the U. S. Treasury. Sources of these monies include timber sales, grazing permits, recreation permits, power permits, mineral permits, admission user fees, and other land uses. Assigned values are dollar benefits attributed to Forest outputs based on an estimated willingness to pay. For many Forest outputs, either no direct payments are made or no actual market exists in which outputs are bought and sold. Dispersed recreation is an example of an output for which an actual market price has not been established, and for which an assigned value is used as a surrogate for the benefits accrued. In other situations, the actual price charged for a Forest output may be less than the consumer's willingness to pay for it, in which case additional benefits accrue to the consumer over and above the dollar value of fees charged. Grazing may be an example of such an output. In either case, both Federal receipts and assigned values are indicators of benefits derived from management of the Forest. To avoid double counting benefits associated with outputs having both Federal receipts and assigned values, two categories are shown in Table IV-53, "Federal receipts" and "assigned values less receipts." The sum of these two equals total undiscounted benefits.

TABLE IV-53

Undiscounted Annual Benefits and Costs by Alternative (Millions of 1978 dollars)

	1/ Benchmark #1	Benchmark #3	A	B	C	D	E	F	G	H
Period 1 (1981-1990)										
Benefits										
Federal Receipts	.190	2.300	2.178	6.051	2.532	2.051	2.267	2.764	2.965	2.870
Assigned Values Less Receipts	59.630	8.571	9.685	6.604	9.198	10.096	10.613	8.523	10.344	11.760
Total Benefits	59.820	10.871	11.863	12.655	11.730	12.147	12.880	11.287	13.309	14.630
Costs										
Forest Service										
Minimum Level Planning and Inventory/	.372	.372	.372	.372	.372	.372	.372	.372	.372	.372
Operation & Maintenance	-	4.034	4.478	7.389	4.784	3.406	7.299	4.810	4.474	4.752
Capital Investment	-	1.274	2.140	2.281	1.887	1.457	1.809	2.086	2.150	1.881
Total - Forest Service	.372	5.680	6.990	10.042	7.043	5.235	9.480	7.268	6.996	7.005
Non-Forest Service	-	1.623	1.359	1.623	1.544	1.463	1.573	1.581	1.619	1.596
Total Costs	.372	7.303	8.349	11.665	8.587	6.898	11.053	8.849	8.615	8.601

	1/ Benchmark #1	Benchmark #3	A	B	C	D	E	F	G	H
Period 2 (1991-2000)										
Benefits										
Federal Receipts	.190	2.200	2.129	4.920	2.723	2.630	2.647	2.717	3.063	3.189
Assigned Values Less Receipts	56.496	15.910	15.141	17.214	16.074	17.381	18.702	17.014	18.363	18.542
Total Benefits	56.686	18.110	17.270	22.134	18.797	20.011	21.349	19.731	21.426	21.731
Costs										
Forest Service										
Minimum Level Planning & Inventory/	.372	.372	.372	.372	.372	.372	.372	.372	.372	.372
Operation & Maintenance	-	4.083	4.797	7.045	4.518	3.690	4.452	4.748	4.076	5.415
Capital Investment	-	.958	2.077	1.609	1.561	1.103	1.412	1.529	1.703	1.812
Total-Forest Service	.372	5.413	7.246	9.026	6.451	5.165	6.236	6.649	6.151	7.599
Non-Forest Service	-	1.723	1.425	1.723	1.653	1.580	1.682	1.688	1.730	1.719
Total Costs	.372	7.136	8.671	10.749	8.104	6.745	7.918	8.337	7.881	9.318

	1/ Benchmark #1	Benchmark #3	A	B	C	D	E	F	G	H
Period 3 (2001-2010)										
Benefits										
Federal Receipts	.190	2.200	2.487	6.475	2.807	2.630	2.190	3.002	2.916	3.126
Assigned Values Less Receipts	55.400	20.947	18.055	21.978	19.972	21.731	23.456	21.325	23.180	23.195
Total Benefits	55.590	23.147	20.542	28.453	22.779	24.361	25.646	24.327	26.096	26.321
Costs										
Forest Service										
Minimum Level Planning & Inventory/	.372	.372	.372	.372	.372	.372	.372	.372	.372	.372
Operation & Maintenance	-	3.511	3.982	6.862	4.802	3.482	4.426	5.403	3.897	4.924
Capital Investment	-	.771	1.670	1.534	1.674	.845	1.384	2.218	1.399	1.526
Total - Forest Service	.372	4.654	6.024	8.768	6.848	4.699	6.182	7.993	5.668	6.822
Non-Forest Service	.372	1.782	1.452	1.782	1.670	1.580	1.671	1.688	1.730	1.739
Total Costs	.372	6.436	7.476	10.550	8.518	6.279	7.853	9.681	7.398	8.561

TABLE IV-53 (Continued)

Undiscounted Annual Benefits and Costs by Alternative (Millions of 1978 dollars)

	1/ Benchmark #1	Benchmark #3	A	B	C	D	E	F	G	H
Period 4 (2011-2020)										
Benefits										
Federal Receipts	.190	2.200	2.077	6.425	2.767	2.840	2.561	3.378	3.147	3.508
Assigned Values Less Receipts	55.400	24.539	20.082	25.433	22.566	25.927	26.975	23.854	26.523	21.839
Total Benefits	55.590	26.739	22.159	31.858	25.333	28.767	29.536	27.232	29.670	25.347
Costs										
Forest Service										
Minimum Level	.372	.372	.372	.372	.372	.372	.372	.372	.372	.372
Planning & Inventory/										
Operation & Maintenance	-	3.835	4.164	6.593	4.169	3.461	4.609	3.884	3.307	4.118
Capital Investment	-	.677	1.758	1.142	1.154	.790	1.363	1.112	1.214	1.145
Total - Forest Service	.372	4.884	6.294	8.107	5.695	4.623	6.344	5.368	4.893	5.635
Non-Forest Service	-	1.841	1.447	1.841	1.693	1.591	1.710	1.716	1.759	1.759
Total Costs	.372	6.725	7.741	9.948	7.388	6.214	8.054	7.084	6.652	7.394

	1/ Benchmark #1	Benchmark #3	A	B	C	D	E	F	G	H
Period 5 (2021-2030)										
Benefits										
Federal Receipts	.190	2.100	2.882	6.490	2.954	2.998	2.869	4.167	3.422	4.338
Assigned Values Less Receipts	55.400	26.595	21.243	27.361	24.518	27.769	28.673	25.068	28.386	28.077
Total Benefits	55.590	28.695	24.125	33.851	27.472	30.767	31.542	29.235	31.808	32.415
Costs										
Federal - Forest Service										
Minimum Level	.372	.372	.372	.372	.372	.372	.372	.372	.372	.372
Planning & Inventory/										
Operation & Maintenance	-	2.668	3.604	6.348	4.096	3.327	4.143	5.095	3.864	4.195
Capital Investment	-	1.144	1.516	1.265	1.204	.684	1.128	1.165	1.302	1.127
Total - Forest Service	.372	4.184	5.492	7.985	5.672	4.383	5.643	6.632	5.538	5.694
Non-Forest Service	-	1.900	1.463	1.900	1.704	1.598	1.740	1.734	1.759	1.774
Total Costs	.372	6.084	6.955	9.885	7.376	5.981	7.383	8.366	7.297	7.468

1/ Benefits for Benchmark #1 (minimum level) are totals. All others are incremental from Benchmark #1.

Table IV-54 is a summary of discounted benefits and costs of alternatives along with incremental present net values and benefit-cost ratios. These two economic parameters are "incremental" in that minimum level benefits and costs were subtracted out before the parameters were calculated. This is to ensure a true marginal economic analysis in which long-run fixed costs and benefits are not included. Alternatives are shown in order of increasing opportunity costs, as measured from Benchmark #3, which portrays maximum present net value (PNV) for the Forest.

The lower PNV of the alternatives as compared to Benchmark #3 can be attributed to either higher costs, lower benefits, or both. Table IV-55 shows contributions to total discounted benefits by resource. This table can be used to partially explain the opportunity cost associated with each alternative. Alternative H has the lowest opportunity cost of all alternatives and has both higher benefits and higher costs than Benchmark #3. On the benefit side, Alternative H has higher benefits

TABLE IV-54

Summary of Cost-Efficiency of Alternatives Based on a Four Percent Discount Rate (All figures in millions of 1978 dollars. Alternatives are arranged in order of increasing opportunity costs.)

	1/ Benchmark #1 (Minimum Level	Benchmark #3 (Maximum Incremental Present Net Value)	H	G	D	E	F	B	C	A
Benefits, Present Value										
Total Benefits	1,232.3	1,674.8	1,701.6	1,682.3	1,654.6	1,675.8	1,647.6	1,699.1	1,624.5	1,596.1
Minimum Level Benefits	-	1,232.3	1,232.3	1,232.3	1,232.3	1,232.3	1,232.3	1,232.3	1,232.3	1,232.3
Incremental Benefits	-	442.5	469.3	450.0	422.3	443.5	415.3	466.8	392.2	363.8
Costs, Present Value										
Total Costs	8.3	116.8	155.3	136.6	117.3	166.0	152.8	205.6	144.5	150.4
Minimum Level Costs	-	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Incremental Costs	-	108.5	147.0	128.3	109.0	157.7	144.5	197.3	136.2	142.1
Benefit-Cost Ratio Incremental	-	4.08	3.19	3.51	3.87	2.81	2.87	2.37	2.88	2.56
Present Net Value, Incremental	-	334.0	322.3	321.7	313.3	285.8	270.8	269.5	256.0	221.7
Difference in Present Net Value from Benchmark #3 (Opportunity Costs)	-	-0-	11.7	12.3	20.7	48.2	63.2	64.5	78.0	112.3

associated with timber, water, wilderness, and wildlife outputs than does Benchmark #3. The two latter outputs are "non-market" outputs having per-unit discounted costs which most likely exceed per-unit discounted benefits.

TABLE IV-55

Contributions to Total Discounted Benefits by Resource (All figures are in millions of 1978 dollars)

	Benchmark #3	H	G	D	E	F	B	C	A
Timber	15.9	24.6	22.8	17.1	15.1	22.4	35.8	18.1	12.8
Range	42.6	32.2	36.0	30.9	33.3	33.0	37.5	33.7	27.5
Recreation									
Developed Recreation - Public	64.1	64.1	54.5	54.6	61.9	61.9	64.2	62.0	60.7
Dispersed Recreation	92.3	92.3	92.3	90.3	92.3	92.3	76.8	90.1	82.8
Downhill Skiing	60.8	56.0	59.3	59.3	56.0	30.0	59.4	59.2	30.0
Wilderness Recreation	32.1	38.7	41.3	32.1	38.7	32.1	32.2	35.0	37.6
Wildlife	214.2	231.2	216.4	212.7	214.3	215.7	215.0	164.4	186.3
Water	1,152.8	1,160.5	1,159.6	1,157.6	1,164.2	1,160.2	1,178.2	1,162.0	1,158.4
Total Discounted Benefits	1,674.8	1,699.6	1,682.2	1,654.6	1,675.8	1,647.6	1,699.1	1,624.5	1,596.1

Alternative H, as well as other alternatives, was required to have at least a minimum level of these types of outputs regardless of their cost-efficiency of production, whereas Benchmark #3 had no such constraints. Imposition of these constraints would, in effect, lower cost-efficiency of management from the maximum as portrayed by Benchmark #3.

Alternative G has the second lowest discounted costs of any alternative, yet has the second highest level of discounted benefits. This corresponds with the emphasis on market outputs under a "reduced budget" regime as well as reduced administrative regulation. Benefits associated with timber, wilderness, wildlife, and water are all higher under this alternative than under Benchmark #3, indicating that higher levels were constrained in than would be produced if cost-efficiency were the only concern. Reduced administrative regulation would result in increased levels of environmental degradation, although no dollar values were included in the analysis for these costs.

Alternative D has an even greater reduction in budget and administrative regulation while emphasizing market outputs. Although discounted costs are lowest under this alternative, non-market costs associated with environmental degradations and other external costs would be highest under this alternative.

Alternative E has discounted benefits almost equivalent to those associated with Benchmark #3, although it has higher benefits associated with wilderness, wildlife and water outputs. This alternative emphasizes meeting RPA goals for all outputs, some of which may have a

negative cost-efficiency at certain levels of production. This could account for the higher costs, as well as lower cost-efficiency compared to Benchmark #3.

Alternatives F, C, and A all have both higher discounted costs and lower discounted benefits that does Benchmark #3. This results from constraints imposed in each of these alternatives to ensure the production of certain levels of outputs having a negative cost-efficiency of production. Alternative B, which emphasizes outputs which produce income to the government, has one of the highest discounted benefits, yet the highest discounted costs. The fact that certain outputs produce returns to the U. S. Treasury is not equivalent to high cost-efficiency, and some may have negative contributions to net discounted benefits.

Resource Values

Some resources produced on the Forest were valued explicitly in the planning process, others were valued implicitly, and some were not valued at all. The benefits shown in Tables IV-53, IV-54 and IV-55 are the result of placing specific dollar values on timber, livestock forage, developed and dispersed recreation, and improved water yield. These are the only outputs that were explicitly valued in the planning process. All of these values are estimates of "willingness to pay." Timber values were calculated using historical Forest-level bid prices from timber sold during the period between 1972 and 1977. All other values were derived from data used in the 1980 RPA and Regional Plan efforts. The values are in terms of 1978 dollars and are listed in Appendix E.

In the FORPLAN model, only timber and livestock grazing were tracked and valued. By using an investment analysis technique known as MTVEST, the costs and benefits associated with recreation and water outputs as well as certain costs were included in the economic efficiency analysis. This resulted in present net value calculations incorporating all four types of resource outputs, as well as all Forest Service budgetary costs. Costs incurred by other Federal and non-Federal entities were estimated for each alternative (Table IV-53), but these were not included as part of the efficiency analysis or the allocation and scheduling process.

The fact that some outputs and costs were not included directly in the FORPLAN allocation model does not mean that they were ignored as allocation decisions were being made. Through constraints imposed on the FORPLAN model, it was possible to implicitly value resources not explicitly priced. For example, in Alternative B one objective was to ensure that increased water runoff was given high emphasis. To do this, inventory constraints were placed on the spruce-fir and Douglas-fir timber types, in which a specific proportion of the area was required to be in a clearcut condition at any one time during the first five decades. Inventory constraints, combined with prescription constraints in which a certain number of acres were required to be managed under the high-water yield prescriptions, allowed the water resource to be incorporated into the economic efficiency analysis even though it was not explicitly valued in the FORPLAN model. A similar technique was used for recreation and other resources.

Another way that resources were implicitly valued in the planning process is through their association with resources that were explicitly priced. For example, no specific dollar values were placed on visual resources, yet they were incorporated in the analysis by virtue of their relationship with dispersed recreation activity. Much of the dispersed recreation taking place is at least partially a function of the visual resources available on the Forest. Management activities which degrade this resource would be expected to cause a corresponding reduction in dispersed recreation activity at that location. The dollar value placed on a recreation visitor day of dispersed recreation can partially be attributed to the visual resource.

Another example of an output that was implicitly priced in this manner is wildlife habitat. No dollar value was placed on an acre of suitable wildlife habitat, yet this resource was valued through its association with hunting and non-game recreation activity. Those management activities which improve wildlife habitat were attributed more wildlife-related recreation visitor days than those which degrade wildlife habitat. In this way, wildlife habitat and diversity were implicitly included in the economic analysis.

Some resources could not be either explicitly valued or valued implicitly through association with other resources. These were nevertheless consciously considered throughout the planning process. Examples of such benefits include research benefits of designated research natural areas, the value to future generations of protecting and preserving cultural resources, the benefits or maintaining viable populations of animal species not related to recreation use, and the vicarious satisfaction derived by some individuals who desire the establishment of designated wilderness areas yet who have no intention of visiting these areas.

Because of the tremendous diversity in the types of outputs produced on the Forest, as well as the variety of methods used to incorporate these values in the economic analysis, it should be noted that the economic parameters used in this planning effort can only serve as relative indicators of the societal benefits that would accrue under each alternative. They cannot be interpreted as absolute indicators of total societal benefits. Some benefits may even be realized too far in the future to lend any weight to an analysis carried out in present value terms.

Demand Curves

The prices used for timber and other outputs in this planning effort were held constant up to the level of projected use. This is equivalent to saying that a horizontal demand curve was assumed over the range of output levels expected under the various alternatives. Complete justification of this assumption would require several pages of mathematical calculations, so a less rigorous explanation is given here.

Production of timber on the Forest takes place within the context of local, regional, and national markets for timber products. Prices for stumpage are determined within this multi-level market context through a variety of factors, one of which is the total volume available. As total volume increases, prices tend to decrease if all other factors remain constant.

If the position that the Forest holds within the market structure is such that the quantity produced significantly affects total volume available within the market, market prices would most likely be sensitive to changes in Forest outputs. Conversely, if the quantity from the Forest does not constitute a significant portion of the total market volume, market prices would be relatively insensitive to changes in Forest output.

On the San Juan National Forest, calculations indicate that market prices are relatively insensitive to variations in timber output within the range of outputs expected under the various alternatives. Therefore, a horizontal demand was assumed over this range, and timber prices do not vary as a function of quantity produced.

Some non-timber outputs from the Forest may be produced in sufficient quantities to affect market price. However, because of "state-of-the-art" limitations, only an average price or value was used for all outputs. Benefits for excess capacity, as in the case of dispersed recreation, were valued at zero dollars. Positive benefits were only attributed to outputs up to the levels of projected use.

Economics of Wilderness Study Areas

An economic efficiency analysis was carried out for all three Wilderness Study Areas (WSA's) on the Forest. Each area was evaluated with respect to its suitability for wilderness designation. This analysis was based on the same dollar benefits for timber, water yield, recreation, and range that were used elsewhere in the planning effort. These are estimates of willingness to pay and are described in the "Resource Value" section above. Annual benefits and costs were estimated over the first five decades and discounted to the present using discount rates of four percent and seven and one-eighth percent.

Results of the analyses at both discount rates are shown in Table IV-56. A present net value (PNV) was calculated for the suitable and unsuitable alternative for each WSA, and an incremental PNV of wilderness designation is also shown. The incremental PNV merely represents the difference between the suitable and unsuitable alternatives. The suitable and unsuitable alternatives referenced here and in Table IV-56 are related to the eight Forest-wide alternatives considered in detail. In each of the eight alternatives, each WSA is identified as either suitable or unsuitable for wilderness. The alternatives in which each WSA is considered suitable for wilderness are as follows: West Needle WSA--Alternatives A, C, E, G, and H; Piedra WSA--Alternatives A, E, G, and H; South San Juan Wilderness Expansion Study Area--Alternatives A and G.

TABLE IV-56

Cost-Efficiency Analysis of Wilderness Study Areas (All figures are in thousands of 1978 dollars, discounted at 4 percent and 7-1/8 percent)

4% Discount Rate

Present Value of Resource Benefits and Costs	Piedra (41,500 acres)		West Needle (32,800 acres)		South San Juan Expansion (21,580 acres)	
	Suitable	Unsuitable	Suitable	Unsuitable	Suitable	Unsuitable
Timber	-0-	3,074	-0-	-0-	-0-	1,224
Water	17,572	18,990	14,307	14,307	20,301	20,623
Recreation						
Wilderness Use	9,057	-0-	4,232	-0-	2,685	-0-
Non-wilderness Use	-0-	15,574	-0-	8,142	-0-	2,750
Range	361	737	112	133	322	344
Total Benefits	26,990	38,375	18,651	22,582	23,308	24,941
Total Forest Service Costs	2,399	4,324	520	397	1,692	3,167
Total Present Net Value	24,591	34,051	18,131	22,185	21,616	21,774
Incremental Present Net Value of Suitable Alternative	-9,460		-4,054		-158	

7 1/8% Discount Rate

	Piedra		West Needle		South San Juan Expansion	
	Suitable	Unsuitable	Suitable	Unsuitable	Suitable	Unsuitable
Timber	-0-	1,945	-0-	-0-	-0-	775
Water	11,120	12,017	9,054	9,054	12,846	13,050
Recreation						
Wilderness Use	5,731	-0-	2,678	-0-	1,699	-0-
Non-wilderness Use	-0-	9,856	-0-	5,152	-0-	1,740
Range	229	466	71	84	204	218
Total Benefits	17,080	24,284	11,803	14,290	14,749	15,783
Total Forest Service Costs	1,528	2,741	331	252	1,079	1,989
Total Present Net Value	15,552	21,543	11,472	14,038	13,670	13,794
Incremental Present Net Value of Suitable Alternative	-5,991		-2,566		-124	

Incremental PNV's are negative for all Wilderness Study Areas regardless of the discount rate used. Considering the costs and outputs valued in the analysis, this indicates that there is a negative net benefit associated with wilderness designation. Of the three, the South San Juan Wilderness Expansion Study Area has the least negative incremental PNV's, indicating that cost-efficiencies under the suitable and unsuitable alternatives are very similar. For the Piedra and West Needle WSA's, incremental PNV's are more largely negative, indicating a greater discrepancy between the cost-efficiency of the unsuitable and suitable alternatives. On the Piedra WSA, a significant portion of this difference can be attributed to higher timber and recreation benefits associated with the unsuitable alternative. On the West Needle WSA, most of the difference can be associated with higher recreation benefits under the unsuitable alternative.

BUDGET ESTIMATES

Budget levels for each alternative are those necessary to produce the goods and services shown, as well as meet minimum management requirements, including laws and regulations, for all resources and uses. Table IV-57 displays the estimated average annual budget necessary to implement each alternative. For comparison purposes, Forest budget expenditures for fiscal year 1980 are also shown. All dollar amounts in the table have been adjusted to the first quarter of 1978 to indicate comparable real dollar costs over time, thus eliminating the effects of inflation.

The comparison indicates that those alternatives with the highest emphasis on market outputs generally have the highest budget requirements. Alternative B was formulated to maximize market outputs and Alternative E was formulated to meet Regional RPA targets. Both have fairly high market output levels which require high budget expenditures to produce them.

Allocated funds are composed mainly of Young Adult Conservation Corps appropriations and Land and Water Conservation Fund appropriations. The allocated funds required in each of the alternatives are somewhat higher than those shown for fiscal year 1980 due to higher objectives for land acquisition. Alternative E shows significantly higher allocated fund expenditures because it has the highest objectives for land acquisition of any of the alternatives.

Alternative D shows the lowest budgetary requirements of any alternative. The intent of the alternative was to identify the set of outputs that could be produced under a reduced budget and reduced administrative regulation and control. The result is that output levels and quality of work are reduced.

Alternative G is similar to Alternative D in that it also has reduced regulatory controls. The differences are that output levels are somewhat higher and that all Wilderness Study Areas are identified as suitable for wilderness in Alternative G instead of available for non-wilderness use.

TABLE IV-57

Total Average Annual Budget - 1981-1990 (Thousand dollars adjusted to 1978 basis)

		Alternative						
	1980	A	B	C	D	E	F	G	H
Operation, Maintenance, and Administration	4,851	4,751	7,560	5,024	3,651	5,941	5,073	4,738	4,997
Capital Investments	1,584	2,140	2,281	1,887	1,457	1,809	2,086	2,150	1,881
(Backlog) 1/	(945)	(394)	(936)	(417)	(593)	(917)	(670)	(593)	(668)
Total Appropriated Funds	6,435	6,891	9,841	6,911	5,108	7,750	7,159	6,888	6,878
Allocated Funds	54	108	201	132	127	1,731	109	108	127
Total	6,489	6,999	10,042	7,043	5,235	9,481	7,268	6,996	7,005

1/ Backlog expenditures include land line location and reforestation which are also included in operation, maintenance and administration and capital investment figures respectively; backlog figures are therefore not additive.

Capital investments include reforestation as well as construction and reconstruction of roads, trails, developed sites, bridges, trailheads, and buildings. Most of these are related to production of market outputs, and thus there is a direct relationship between the market output target levels of an alternative and its capital expenditures. Alternative A has the lowest emphasis on commodity production, yet a fairly high expenditure for capital investments. This can be explained by the high level of trail construction and reconstruction that would be required by the dispersed recreation targets.

EMPLOYMENT, POPULATION AND INCOME

Each alternative would have a unique effect upon employment, population, and total income patterns within the five-county area of influence of the San Juan National Forest. Differences are mostly a function of output levels that would be produced under each alternative. Of primary importance to the regional economic situation are the San Juan National Forest outputs of timber, recreation, and grazing. Major variations from current production levels in any of these three would have the greatest possibility of affecting the degree of productive harmony that

presently prevails within the economic area. Therefore, alternatives must be carefully evaluated from a local as well as regional and national economic perspective.

Effects of each alternative on employment, population, and total income within the five-county economic impact area were evaluated by using an input-output (IMPLAN) analysis model. Such a model considers the total direct, indirect, and induced effects of Forest outputs. In doing so, it accounts for a multitude of interrelationships between producing and consuming sectors within an economy. The midpoint of the first planning period, 1985, was selected as an "index year" to serve as a base for making relative comparisons of alternatives. It must be noted that the I-O model is based on historic data, and therefore is not responsive to changes in such variables as national markets, interest rates, inflation, and changes outside of the economic impact area. It serves mainly as a tool to quantify the relationships between Forest outputs and important parameters such as income and employment at a specific point in time. The model is static in all other respects.

Table IV-58 displays the population, employment and income affected by National Forest activities in Archuleta, Dolores, La Plata, Montezuma, and San Juan Counties. These estimates are based on the assumption that the quantity of outputs produced on the Forest to meet perceived demand will be entirely consumed. An additional assumption is that other governmental entities as well as the private sector will alter production only in response to changes in Forest outputs. Because of these and other assumptions, the estimates can only serve as relative indicators of the effects of the alternatives on the local economic situation.

Table IV-58 also shows the current population, employment and income picture within the five-county area (based on 1979 and 1980 data). This base data allows an evaluation of the relative magnitude of change that might take place in the first decade under each alternative. Current estimates are that 12 percent of total employment in the area can either be directly or indirectly attributed to Forest outputs and activities. This was calculated by running the input-output model with current levels of outputs and comparing the resultant "changes" estimated by the model with actual employment data for the five-county area of influence.

The greatest absolute change in employment within the area is caused by changes in the sectors related to tourism. The I-O model defines tourism-related sectors to include eating and drinking places, hotels, places of amusement, personal service establishments, and the ski industry. Therefore, Alternatives B, H, G, and E, with their relatively high recreation outputs, would also have the greatest effect on total employment within the area. Population changes are associated with changes in employment as members of the workforce migrate to the area with their families. Alternatives A and D, because of relatively low timber outputs, would result in a decrease in employment in the logging and sawmill sectors, yet the net effect would be a slight increase in employment by the year 1985. Alternatives C and F would result in employment changes that are intermediate between the extremes demonstrated by the other alternatives.

TABLE IV-58

Population, Employment, and Income in the Five-County Area of Influence in Base Year 1980 (Current) and Changes from Current by Alternatives During First Decade

Alternative	Population	Total Employment (Number of Jobs)	Employment Selected Sector (Number of Jobs)			Total Income (Thousand Dollars)
			Agriculture	Logging/ Sawmill	Tourism	
Current (1980) Level (Total)	49,573	22,606	450	680	3160	273,656
A	2,500	1,144	65	-7	515	16,420
B	6,690	3,178	187	357	1,537	46,730
C	5,450	2,488	159	48	1,441	35,060
D	4,892	2,234	165	-41	1,030	38,090
E	5,940	2,711	176	45	1,504	35,010
F	2,740	1,252	98	51	536	18,230
G	6,320	2,886	189	99	1,524	41,400
H	6,380	2,914	189	90	1,537	41,710

Differences in total income from one alternative to another show generally the same patterns as employment differences. This can be explained by the fact that in all sectors of the economy at least some labor is required to generate income. Therefore, a positive correlation exists between income and employment, although this correlation varies as a function of the labor and capital intensity of the industry. For example, timber harvesting is a relatively capital-intensive activity, and therefore, as timber outputs from the Forest are increased, there is a greater change in total income than in employment. Conversely, grazing is a relatively labor-intensive activity, and as livestock outputs from the Forest increase, there would be a proportionally higher change in employment compared to income. These relationships are somewhat disguised in Table IV-58 due to the fact that outputs from both labor and capital-intensive activities (e.g., timber and grazing) are both higher in some alternatives than in others. No single alternative can be identified which necessarily has a preponderance of outputs from either capital intensive or labor-intensive activities.

RETURNS TO THE TREASURY

Total returns to the U. S. Treasury were calculated for each alternative by summing the returns from each of the various revenue-producing activities on the Forest. These activities are listed in the following

section. For all of these categories, estimates were made of the revenues that would be produced at the midpoint of the second planning period (1995). Estimates were made in 1978 dollar terms, and these are listed in Table IV-59.

TABLE IV-59

Estimated Returns to U. S. Treasury by Alternative in 1995 (1978 dollars)

Alternative	Returns
A	$1,739,000
B	4,019,000
C	2,224,000
D	2,148,000
E	2,162,000
F	2,207,000
G	2,502,000
H	2,606,000

PAYMENTS TO COUNTIES

Each year, 25 percent of the value of receipts from National Forest outputs goes to the State for distribution to the counties in which the National Forest is located. Payments are based on the number of acres of National Forest System land within each county. The following components comprise the receipt categories of the "25 Percent Fund":

-Gross receipts from timber harvested
-Land use permits
-Recreation permits
-Power permits
-Mineral permits
-Recreation user fees
-Grazing fees
-Knutson-Vandenberg Act Funds
-Timber purchaser road credit

In addition to these payments, additional payments in lieu of taxes are authorized for some counties where other payments are less than 75 cents per acre. This program of payments in lieu of taxes is dependent on annual Congressional appropriations and is administered by the U. S. Department of Interior, Bureau of Land Management.

Predicted payments to counties from the "25 Percent Fund" in year 1995 by alternative are shown in Table IV-60. Figures are in terms of 1978 dollars.

From the table, there appears to be a large discrepancy between actual payments to counties in 1980 and those predicted for 1995 under each alternative. This can be attributed to a variety of factors, but the most significant ones relate to the assumptions made for timber and mineral resources. Estimated timber receipts were based on an average selling price of timber over the past five years. Prices have decreased in recent years, and therefore five-year average prices are higher than 1980 prices. Since timber prices were low, payments to counties in 1980 were correspondingly low. Another assumption was that all timber offered for sale in 1995 under any alternative would be sold. This has also not been the case in recent years. With respect to minerals, 1980 RPA projections are for an increase of approximately 265 percent in minerals receipts between 1981 and 1995. This assumption was applied consistently across all alternatives, and further contributed to relatively high estimated payments to counties in 1995.

These assumptions, plus the fact that many other outputs are estimated to increase between 1981 and 1995, are responsible for the large differences between historic and predicted payments to counties.

SOCIAL EFFECTS BY HUMAN RESOURCE UNIT

Alternatives are based on different management emphases placed on specific land areas on the National Forest. Because these different emphases produce different levels of resource outputs, they generate various social effects in the Forest's area of influence. However, the output levels of all alternatives fall within a fairly narrow range, because of resource capabilities, National and Regional needs, and legal constraints. Therefore, the overall social effects across the entire area of influence of implementation of any of the alternatives will often be more subtle and difficult to discern than the social effects on a particular community of a major mineral or ski area development.

The social effects of alternatives where the Wilderness Study Areas are determined suitable for wilderness designation have been considered in the overall analysis of an alternative. The social, as well as economic effects are a direct result of the values or outputs foregone as discussed in the individual resource sections. The actual calculations and estimates have been incorporated into each alternative analysis.

The Montelores, Animas and Pagosa Human Resource Units (HRU) were designated to help design management actions at the National Forest and Ranger District levels that would be responsive to local issues, conditions and needs. These units are described in Chapter III, The Affected Environment. The following discusses social effects in each of these HRU's.

TABLE IV-60

Predicted Payments to Counties by Alternative in 1995 (Figures are in terms of 1981 dollars)

Alt.	Archuleta	Conejos	Dolores	Hinsdale	La Plata	Mineral	Montezuma	Rio Grande	San Juan	San Miguel	Total
1980	40,091	420	35,282	17,942	39,339	13,893	24,320	524	14,449	420	186,680
A	93,472	869	82,169	41,737	91,734	32,172	56,518	1,304	33,911	869	434,755
B	216,015	2,010	189,892	96,453	211,996	74,348	138,614	3,014	78,368	2,010	1,012,720
C	119,556	1,112	105,098	53,383	117,332	41,150	72,290	1,668	43,373	1,112	556,074
D	115,475	1,074	101,511	51,560	113,326	39,745	69,822	1,611	41,893	1,074	537,091
E	116,220	1,081	102,165	51,894	114,057	40,001	70,272	1,622	42,163	1,081	540,556
F	116,065	1,109	104,901	53,283	117,112	41,072	72,155	1,665	43,292	1,109	551,763
G	134,502	1,251	118,236	60,056	131,999	46,293	81,327	1,877	48,796	1,251	625,588
H	140,048	1,303	123,113	62,533	137,443	48,203	84,681	1,954	50,808	1,303	651,389

Montelores Human Resource Unit

Social Change - The social setting of the Montelores Human Resource Unit (HRU) is best described as an area of stability. The HRU has experienced slow steady growth over the past years with only minor fluctuations.

Cortez is the largest community in the HRU and is primarily a center of commerce. Cortez is a service center to the agricultural community, the location of numerous Federal, State, and local governmental offices, and a base of operations for a growing oil and gas industry. A large segment of the population is dependent on the tourist industry. Mesa Verde National Park, which draws hundreds of thousands of out-of-State visitors annually, Hovenweep National Monument, and the San Juan National Forest are the primary tourist attractions in the HRU.

The smaller communities of Mancos, Dolores, and Dove Creek are somewhat different from Cortez in their social make-up and relationship to the San Juan National Forest. Some of the families in these portions of the HRU are second and third generations and are involved in the wood products, ranching, and farming industries.

A number of the ranching families are directly dependent on National Forest grazing. Family owned and operated ranches and farms are still the dominant type of agriculture in the HRU. Children of ranchers and farmers still have the option of remaining in the family operation and some choose to do so.

National Forest timber supports about ten sawmills in the HRU. All, with the exception of one, are locally owned and operated. The mills produce everything from wooden match sticks and excelsior to posts, poles and dimension lumber.

Recreation on National Forest System lands in the HRU centers around big game hunting, camping, picnicking, cross-country skiing and snowmobiling. Most of the recreationists are local residents or people coming in from Texas, New Mexico and Arizona.

The area has gained stability through diversity, with a good balance of recreation, tourism, farming, ranching, wood products, minerals, oil and gas, and commerce industries.

The issues of the HRU primarily center around community activities such as schools and municipal services. There is some concern about the construction of power transmission lines and pipelines but it centers around rights of private land owners. Concerns over the impact of out-of-State construction workers brought in to build McPhee Reservoir is also being expressed; and unemployment rates are rising.

Change is on the horizon in the HRU. The building of the Dolores Project and the expanding of the oil and gas CO_2 industry will stimulate the most change. Factors other than National Forest management will be the most direct cause of change in the HRU in the future. At present, the citizens of the HRU are optimistic about increased development and feel that they will be successful in absorbing change as they have done in the past.

Effects of Alternatives - The major areas of social life in this HRU which could be affected by Forest Plan alternatives are: 1) the traditional uses of grazing and timber; 2) the increasing popularity of the area in general as a tourist attraction; and 3) potential ski area expansion and development.

The rural agricultural way of life associated with sheep and cattle ranching, and pinto bean and wheat farming contributes to a stable economic base and way of life for much of the area. Alternatives A, C, D, E, F and H decrease the amount of grazing to some extent during the first decade, although the reductions in Alternative F and H are relatively minor. All alternatives, with the exception of Alternative A, would provide grazing over current levels by 1990. Grazing use under Alternative A would remain at significantly reduced levels. Negative or positive effects of the respective alternatives would depend upon the demand for grazing at the time.

A high percentage of timber harvested on this Forest comes from the Montelores HRU. Although Alternatives A, D and E initially decrease timber outputs, only Alternatives A and D decrease the outputs in this HRU drastically. Depending on whether demand develops from other areas such as Pagosa Springs, current operations could be affected by these alternatives. If there is not a demand from other areas, the impact on existing operations would be minimal. All alternatives except A and D would rise to match the current level of sales offered by 1990. Alternative B drastically increases the timber offered, so the timber industry would benefit, although it is not known whether existing mills could handle the increase by themselves.

The recreation industry is expected to grow in the Montelores HRU over the next decade with National Forest use being only part of its growth. The Dolores Project, along with the increasing popularity of existing attractions of the area, will lead to increased use. Recreation opportunities increase under all alternatives. A major impact on the lifestyle of residents of this HRU could occur from ski area development near Dolores (Dunton) and Mancos (Echo Basin). This could occur in Alternatives B, C, D, and G. Depending on the rate and degree of development associated with the ski areas, the stability of the HRU could be disrupted. While development of ski areas can stimulate economic development and provide jobs, it can also create rapid growth which can strain community services and disrupt existing lifestyles and values.

Animas Human Resource Unit

Social Change - The best way to describe the social setting of this human resource unit (HRU) is that it is in a time of transition. The most prevailing change is population. Not only is the population growing in numbers, but the newcomers are bringing with them different attitudes toward the physical environment and the use of resources.

The "old" second and third generation families, traditionally involved in agriculture ranching and logging, are still in the area; but increasing numbers of recreation-oriented people are continually moving into

the HRU. It has been estimated that the Durango area is about 70 percent to 30 percent new to old publics, while Bayfield is about 60 percent to 40 percent new to old.

Whereas the more established families came to the HRU 20, 50, or even 100 years ago to graze cattle, harvest timber, or work the mines, the newer families are coming to the HRU to ski, backpack, and enjoy the scenery and climate. Many newcomers are coming to "escape" crowded, fast-paced urban areas or as part-time residents and second or third homeowners. The biggest difference is that the older families came because of the work opportunities and learned to love the land; the new families have come because they love the land and found work opportunities.

In order to put things into perspective, one must note that it is the Rocky Mountains that are bringing people into the HRU, not the San Juan National Forest. The HRU would continue to attract people, and the area would continue to be in a social transition even if the U. S. Forest Service were not in the area. It has been estimated that management of the San Juan National Forest may contribute up to 10 percent of the total change occurring in the HRU. The other 90 percent of the change is being brought about by factors such as public attitude, national economics, and the physical desirability of the HRU itself.

The one thing newcomers and the older families have in common is the high value set on unpolluted and uncrowded environments. Slower paced, rural lifestyles are also important, but newcomers tend to have a "faster" definition of slow-paced than the long-term residents. As more people are attracted to the HRU for those attributes, the more those attributes are diminished. The most prevelant issue in the HRU at present is growth. A recent phenomenon in the HRU is the emergence of the "last settler syndrome." A few short years ago the attitude of the HRU was "everyone is welcome," but now residents are concerned about the growth and its relationship to their lifestyle. The "last settler syndrome" as it is locally referred to is best described as "Now that I'm here, let's not let anyone else in."

The projected outlook for the HRU is a continuing trend of persons being attracted to and moving into the area. Water will be the limiting factor in growth. Recreation demands will increase while the more traditional resource uses of timber harvesting and family ranching will decrease.

Effects of Alternatives - The continuation of current management direction (Alternative F) would be responsive to road-oriented recreation, but would not be meeting the changing values of newcomers to the more dispersed, semi-primitive types of recreation. Alternatives A and F show the lowest increases in tourism-related employment. The traditional lifestyle of the area, and its orientation to the National Forest in resource use such as grazing, timber and hunting big game is expected to continue. Continuation of current management direction would continue to meet demands for timber and grazing through the planning period, thus sustaining the existing lifestyles as they depend on those resources.

Alternatives A, D and E reduce the timber production from current levels during the first decade, and could therefore have a negative effect on the timber industry in this HRU. This would contribute to the decline of the more traditional way of life and traditional use of the Forest. Grazing would be reduced under Alternatives A, C, D, E, F and H during the first decade. Although trends indicate a decline in family ranching, the demand for grazing will remain high because of corporate ranching operations. Those family ranches which depend on National Forest grazing would probably experience an economic loss from Alternatives A and D the most and to a lesser extent in Alternatives C and E.

Alternatives A and G apply a more restricted entry management for wilderness. The likely effect of this would be to limit wilderness use. This area is already an attraction for wilderness users, and limits could harm associated tourist business.

Some destination campgrounds would be closed in Alternatives D and G, possibly over-crowding the remaining ones. Availability of fuelwood would decrease, serving to intensify existing problems.

All alternatives allow the existing approved expansion plans of Purgatory Ski Area, thus benefitting ski area development interests and the local economy. Alternatives B, C, D, E, G and H would retain opportunities for a new ski area (Grayrock-Cascade) to develop in this HRU. Development of this area could be disruptive to the service sectors and the quality of life. The social impacts of an additional ski area would depend on the rate and degree of development. Purgatory Ski Area would be allowed to continue with existing approved plans for expansion under Alternatives A and F, but would be restricted to that alone. Growth associated with land development in the proximity of the area would not occur as rapidly as under other alternatives and the impact on roads, sewer and water would not be as dramatic.

Alternative B is the extreme alternative for maximizing market outputs. More timber would be produced than there is a current demand for. New mills would have to open or come from outside the area to harvest the timber. There would be an abundance of grazing, which would aggravate existing conflicts with private land owners, hunters who would rather see the habitat used for big game, and recreating publics who don't like to see cattle in the National Forest. Developmental projects such as timber sales and roads would increase and occur near wilderness areas which could affect the attractiveness of the area to wilderness users and tourism in general. Scenic quality would diminish under this alternative. Downhill skiing would be maximized, and although the area would benefit for a while, overdevelopment could eventually decrease the desirability of the area and its quality of life. The qualities which attracted people to move to the area in the first place would rapidly disappear due to the emphasis on rapid growth, development and production. Roads, water treatment and sewer are presently burdened by growth. They would not be adequate to meet the rapid growth resulting from this alternative.

Alternatives C, E, G, and H attempt to maintain the traditional resource uses at current or slightly increased levels, while attempting to satisfy the changing, increasing demands for a recreation oriented way of life. Alternative H attempts to respond to what it is that attracted people to the area, the abundance and quality of open space, scenery, and recreation opportunities, while maintaining the traditional way of life as it currently depends on the National Forest.

Pagosa Human Resource Unit

Social Change - The social setting of the Pagosa Human Resource Unit (HRU) is currently undergoing dramatic change. One resident of Pagosa Springs said "...Whatever you write about the social make-up of this area will be out-dated in six months."

The "old" second, third, fourth and even fifth generation residents, whose families were involved in livestock grazing and logging, are rapidly finding themselves more and more in the minority. Sawmills have closed, ranches have been sold to real estate developers and the "newcomers" are arriving in increasing numbers. Currently there are at least 84 practicing real estate agents in the HRU. Last year alone, 340 new living units (single family dwellings and condominiums) were constructed in the HRU.

Some of the residents of the HRU are descendants of Hispanic families who were originally involved in the land grants by the Governor of Mexico five and six generations ago. They remain strongly tied to the land and area. Other residents are descendants of Anglo homesteaders of three generations ago. Although many have sold their ranches to developers, there are 20 to 30 families who continue in the family ranching business.

Some of the new residents are people who have worked and retired in another part of the nation and have purchased their retirement home in the HRU. Still other new residents are people who have moved to the HRU to escape the pressures of a fast-paced urban environment. They are either bringing their businesses with them, buying existing businesses in the HRU, or creating new ones.

A growing part of the population are people who have purchased second or third homes in the HRU and live in the area only part of the year. There is an absentee landowner population who live in another part of the country but have invested heavily in developing lands within the HRU.

The political and social base is changing rapidly from land ownership and tradition to money. Therefore, community issues are more prevalent at the present time than issues related to the National Forest.

The area attracts people because of its setting and charm, rural slow-paced living, its clear air and water, and for the more established residents, strong family ties. The San Juan National Forest is prized by the residents because it provides an unequaled green belt and open space.

The residents of the HRU are beginning to realize that the qualities of the area that either attracted them or have kept them there, are beginning to diminish as more people move to the area. The possibility of the development of two new ski areas and oil and gas development is beginning to polarize residents on both sides of the issue. The effects of additional development on wildlife and water are of concern to all.

Effects of Alternatives - The areas of social life which will be impacted by the Forest Plan alternatives include ranching, two proposed ski areas and associated impacts, recreation-oriented lifestyles and tourism, and timber production.

The majority of the grazing permittees are not residents of the HRU, but ship their cattle to the allotments for grazing from New Mexico and other parts of southern Colorado. Although all alternatives, except Alternatives B and G, reduce grazing to some extent during the first decade; only Alternative A would materially affect grazing permittees in the long-term.

The proposed East Fork Ski Area is permitted in Alternatives B, C, D, E, G, and H. The ski area would be located in Mineral County and the social impact would be felt in Archuleta County. Thus, Mineral County would receive all of the tax revenues and benefits of the area while the impacts on the school system, law enforcement and other county services would occur in Pagosa Springs. The rapid development typically associated with a major ski area would also disrupt the lifestyle of Pagosa Springs as it presently exists.

The Windy Pass Ski Area proposal is also allowed in these same alternatives. It is a small proposal for a day use area. It has good access from the highway, and has base property already acquired. Because of its size and its day use character, the impact on Pagosa Springs would not be as dramatic and its stimulus to growth not as great as the East Fork area.

Newcomers moving into the area are attracted to it primarily for the amenities offered. The San Juan National Forest is viewed as provider of open space, esthetics, recreation, big game hunting and fishing. Alternatives B and F would establish larger road systems which with use and human activity could diminish wildlife populations and consequently reduce the quality of hunting and impact the outfitter-guide operations. Alternatives D, G and H would also increase road system miles but to a lesser degree.

Tourism is the leading industry in the HRU and is expected to flourish regardless of the management policies and practices on the San Juan National Forest. Wolf Creek Industries and Chimney Rock Lumber Company are two existing operations within the HRU. Largely, the majority of the timber harvesting on the National Forest in the HRU is done by operations based outside the area. Therefore economic benefits go outside the HRU with the exception of the "25 percent fund" payments to counties. There would be few benefits to the HRU by the increased amount of timber produced in Alternatives B, G, and H.

All alternatives retain the option in the area of the Chimney Rock Archaeological Area for commercial development of the Capote Lake Area by the Southern Utes. Alternatives B, C, E and H would emphasize increased public recreation use, therefore increasing the possibility for commercial development of Southern Ute properties.

MINORITIES AND WOMEN

Effects on minorities and women from implementation of any of the alternatives could result from one of two areas: internal Forest Service programs in which members of minority groups and women are hired directly by the agency, and external opportunities in which members of minority groups and women could obtain Forest Service contracts and permits or work for those who do. Employment of women and minorities within the agency fall under the auspices of the Equal Employment Opportunity (EEO) Program, in which the San Juan National Forest is an active participant. At the end of fiscal year 1981, there were 38 minority employees on the Forest, six of which were professional. There were also 46 women employed, of which five were professional. The level by which hiring of minorities and women would vary among alternatives is directly related to the budget. As agency funding increases, program dollars, and thus total employees would also increase.

Although it would appear the ratio of minority and women employees to total employees should not be affected by the philosophy of any of the alternatives, in actuality, the lower funding levels will disportionately affect these individuals due to two factors. First, a high percentage of these individuals occupy the lower level positions. These positions would be more likely to be abolished in a reduced funding situation. Secondly, many of these individuals have less seniority than other employees, due to emphasis on Equal Employment Opportunity beginning in the Federal sector only in the early 1970's, and in a reduction in workforce situation these employees would be more likely to be separated. The funding level is the most relevant factor to be used to predict changes in direct employment of women and minorities, if the above factors are also considered. The alternatives ranked in order of decreasing National Forest budgets in the first decade are as follows: B, E, F, C, H, A, G, and D.

Additional effects on minorities and women could be realized through contracts let by the National Forest. Currently, approximately 10 percent of the dollar value of all contracts are set aside as "8A" contracts which are reserved by the Small Business Administration to develop minority and women contractors. These involve such activities as thinning, tree planting, fence building, and road construction. Obviously, as the level of these activities varies by alternative, so would the total dollar value of "8A" contracts. Since most of the work placed under contract by the San Juan National Forest relates to market outputs (e.g., timber and livestock grazing), there is a direct relationship between these outputs and the availability of women and minority contract opportunities. Alternative B, with high emphasis on such outputs, would provide the greatest opportunity for women and minority contracts, whereas Alternative A, with low emphasis on such outputs, would provide the least. Other alternatives would have effects between the extremes represented by Alternatives A and B.

Certain types of development taking place within the boundaries of the San Juan National Forest could also have significant impact on minorities by altering such factors as income and employment patterns, cost of living, and community stability. Problems would be especially acute in communities that have a relatively high proportion of minority residents. Examples of developments that could have such effects include ski areas, minerals extraction, timber sales, and recreation sites.

New ski area developments, which are possible under several alternatives, could occur in the areas near Dolores, Mancos, and Pagosa Springs. Such developments bring with them additional unskilled jobs such as lift line attendants, ticket salespersons, and restaurant and motel workers. Community stability can be drastically affected as real estate prices escalate leading to higher taxes in the area. This would tend to force lower income level groups, which include a substantial number of minorities, from the area. In order to mitigate detrimental effects on minorities, retraining would be necessary to allow minority members to remain and fill positions that would become available. Often, these positions are low paying but are in great demand by those who migrate to the area seeking the newly established amenities.

Other developments within the San Juan National Forest boundaries, such as mineral extraction projects, timber sales, and recreation sites lead to the creation of a limited number of semi-skilled and unskilled positions, a portion of which would be short lived, and thus not able to support resident minority populations. It is difficult to portray just how each of the alternatives would effect minorities in this respect because of the variety of conditions in which they live as well as the myriad of factors which would impinge upon their welfare as a group.

CONFLICTS

RESOURCES PLANNING ACT (RPA) PROGRAM OBJECTIVES

Annual outputs for each alternative in the year 1995 were compared with the annual outputs and activities assigned to the San Juan National Forest by RPA through the Regional Plan. Table IV-61 reflects these targets. The estimation of these by alternative is included in Appendix K. The sample year 1995 was used to reflect the situation and account for implementation in the early years within the Plan's timeframe. A similar review was made to compare the projected total 50-year outputs between RPA and the alternatives.

Recreation, Developed and Dispersed

All alternatives exceed the RPA objectives primarily due to rapidly expanding populations in the area and associated higher recreation use.

Trail Construction/Reconstruction

All alternatives, except Alternatives B, D and F, are within 20 percent of the 1995 RPA objective. Alternatives B, D and F do not require as high a level because of their emphasis on market outputs.

TABLE IV-61

Regional Plan Assignment of Outputs and Activities - San Juan National Forest

Output Activity	Unit of Measure	Annual Units 1981	1982	1983	1984	1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
RECREATION											
Developed Recreation Use (Includes Visitor Information Service)	Million Visitor Days	.90	.80	.70	.70	.80	.90	1.20	1.50	1.70	1.70
Dispersed Recreation Use (Includes Wildlife and Fish)	Million Visitor Days	1.20	.80	.90	1.00	1.00	1.10	1.40	1.80	1.90	1.90
Trail Construction/ Reconstruction	Miles	12.0	36.0	44.3	50.0	52.0	52.0	53.0	53.0	54.0	54.0
WILDLIFE AND FISH											
Wildlife Habitat Improvement	Thousand Acre Equivalents	40	46	40	66	72	80	65	50	26	26
RANGE											
Grazing Use (Livestock)	Thousand Animal Unit Months	157.0	165.0	165.0	168.0	169.0	169.0	169.0	169.0	170.0	170.0
TIMBER											
Programmed Sales Offered	Million Board Feet	41.9	36.0	33.0	30.0	30.0	31.0	34.0	35.0	35.0	40.0
Reforestation	Acres	3221	3200	7313	4600	4450	5300	5900	5900	5900	5900
Timber Stand Improvement	Thousand Acres	1.20	.80	1.00	1.00	1.00	0.40	0.30	0.80	0.80	1.00
WATER											
Meeting Water Quality Goals	Million Acre-Feet	1.90	1.90	1.90	1.90	1.90	2.05	2.15	2.20	2.20	2.20
MINERALS											
Mineral Leases and Permits	Operating Plans	171	300	300	349	360	392	454	520	606	612
HUMAN & COMMUNITY DEVELOPMENT											
Human Resource Programs	Enrollee Years	6	30	30	30	30	No targets assigned after 1985.				
PROTECTION											
Fire Management Effectiveness Index	Dollars/ Thousand Acres	103	103	103	261	260	254	254	254	252	251
Fuelbreaks and Fuel Treatment	Thousand Acres	1.4	5.6	5.6	5.6	5.2	4.0	4.0	3.1	3.1	3.1
LANDS											
Land Purchase and Acquisition Excluding Exchange	Thousand Acres	.820	2.900	2.900	2.900	3.000	1.130	--	--	--	--
SOILS											
Soil and Water Resource Improvement (Improved Watershed Condition)	Thousand Acres	.602	.038	.038	.038	.038	.038	.038	.030	.030	.030
FACILITIES											
Road Construction/ Reconstruction (Arterial, Collector)	Miles	3.0	4.4	--	6.8	7.9	15.5	10.2	8.7	5.7	2.8

Wildlife Habitat Improvement

All alternatives are greatly above the 1995 RPA objective, primarily due to higher vegetation manipulation activities in other resource programs that improve wildlife habitat.

Range - Grazing Use

All alternatives except Alternative A meet or exceed the RPA objective in 1995 (3 percent to 14 percent increase in range). Alternative A provides only 88 percent of the RPA objective because livestock grazing use was constrained to address some public issues and management concerns.

Timber - Programmed Sales Offered

Alternative A meets only 76 percent of the 1995 RPA objective while Alternatives F, G, and H exceed the RPA objective by 14, 18 and 24 percent respectively. Alternative B greatly exceeds the objective by 113 percent. This is a reflection of the various emphases of the alternatives. Alternative D comes very close (96 percent) to the 1995 RPA objective; however, it only meets 69 percent of the 1985 objective. This is a reflection of reduced budgets for D. Alternatives C and E meet the 1995 RPA objectives.

Reforestation

In 1995, Alternative B meets the RPA objective within 2 percent. The other alternatives are below the RPA objective by a range of 71 percent to 100 percent. These large percentage decreases are a function of reducing the reforestation backlog prior to 1985. In the long-term, reforestation needs are much less than the RPA objectives for all alternatives except Alternative B.

Timber Stand Improvement

All alternatives exceed the RPA objectives significantly due to the need to control understory vegetation (Gambel oak) in the ponderosa pine type.

Water Meeting Quality Goals

Meeting water quality goals is constrained by mine acid drainage on patented and BLM lands in the Animas and Dolores River drainages. Approximately 25 percent of the Forest yield is reduced below water quality standards by chemical pollution. Excess sedimentation from three watersheds lowers this an additional two percent below water quality goals. All alternatives increase this output from present levels to approximately 84 to 86 percent of the RPA objective in 1995 through watershed improvement in these watersheds. However, the predicted water quality not meeting RPA objectives would probably stay near this percent level unless large investments are made to correct mine acid drainage on private lands.

Protection - Fire Management/Effectiveness Index

All alternatives are at 55 to 57 percent of the RPA objective for 1995. Several years ago, when the fire management study was completed for the San Juan National Forest, it was determined that the most effective level of operation was between 108 and 113 dollars per thousand acres. The RPA objective does not reflect the more specific Forest study.

Protection - Fuel Treatment

All alternatives except Alternative A exceed the 1995 RPA objective by a range of 35 to 98 percent. The major reason is the need for treatment of natural fuels (Gambel oak) in those areas of the ponderosa pine type managed for timber production.

Lands Acquisition

Alternative E meets the RPA objectives which are only established through 1990. All other alternatives have a lower but more balanced lands acquisition program throughout the next fifty years.

Soil and Water Resource Improvement

In terms of percent difference when compared to the 1995 RPA objective, Alternatives A, B, C and H are substantially higher and Alternatives D, F and G lower. Percent-wise, the variances appear significant; however, the largest annual variance is only 38 acres. Soil and water resource improvement needs are directly related to other resource program activities.

Facilities - Road Construction/Reconstruction

All of the alternatives except E show a need for a higher level of arterial and collector road construction/reconstruction than is shown in the RPA objective. The great majority of this need is in reconstruction of existing roads to maintain a satisfactory transportation system.

The elements of minerals and human and community development fully meet RPA targets at assigned levels for all alternatives.

OBJECTIVES OF OTHER FEDERAL, STATE, COUNTY, AND LOCAL GOVERNMENTS

Early in the planning process, interested and affected agencies at the different governmental levels, were asked to enumerate their concerns. This effort included scoping meetings, writing letters and news releases, and implementing the State Clearing House procedures. The San Juan National Forest Supervisor also participated with the Southwest Inter-Agency Resources Council.

A review of plans, and written and verbal comments, did not identify any major conflicts. The review identified the following opportunities or areas needing specific attention:

-Archuleta County and Pagosa Springs residents are in the process of forming a water conservancy district with the purpose of constructing and operating the Echo Creek Reservoir for domestic, commercial and agricultural purposes. Alternatives D and G are incompatible with these plans because a high emphasis on livestock management is in the location of the proposed reservoir.

-The increase in numbers of deer and elk envisioned by the Colorado State-wide Comprehensive Plan for National Forests (for the San Juan National Forest) will be met by 1985 only in Alternative B. However, by year 1990 the proposed increases are met by Alternatives E, G, and H. They are met in all alternatives except F by the year 2000. All alternatives provide for the amount of habitat improvement acres called for in the "Comprehensive Plan."

-All alternatives fail to provide the level of developed recreation site outputs as enumerated in the 1981 Colorado Outdoor Recreation Plan. The State's expectations of a large increase in trail miles will also not be met.

-Local counties have long used live streams as a source for gravel. Direction established in the Forest Plan for riparian areas will curtail this traditional use unless there is an overriding demonstrated public need.

OTHER ENVIRONMENTAL EFFECTS

EFFECTS ON PRIME FARMLANDS, WETLANDS, AND FLOOD PLAINS

There are no prime farmlands within the San Juan National Forest, so no effects were estimated.

No significant adverse effects on wetlands or floodplains are anticipated. Floodplains and wetlands will be protected in all alternatives through direction contained in the Forest-wide Management Requirements and by riparian management established in the Forest Plan. Wetland protection (as required by Executive Order 11990) will be provided by ensuring that new construction of roads, campgrounds, and buildings will not have adverse effects on wetlands. In addition, wetland evaluation will be required prior to issuing special use permits in areas where conflicts with wetland ecosystems may occur. Specific standards and guidelines were designed to conserve riparian areas and protect floodplain values (as required by Executive Order 11988). Protective measures for riparian areas include buffer filter strips, stream channel stability maintenance, instream flow maintenance, and timber management that meets wildlife, visual, and riparian ecosystem goals. Floodplains will be managed by locating critical facilities out of floodplains or by using structural mitigation measures (e.g., deflection structures, riprap). Floodplain "parity" will be maintained in land exchanges.

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The relationship between the short-term uses of man's environment and the maintenance and enhancement of long-term productivity is complex. For the purposes of this assessment, short-term uses are those that

generally occur on a yearly basis on some part of the San Juan National Forest, such as livestock grazing as a use of the forage resource, timber harvest as a use of the wood resource, and recreation and irrigation as uses of the water resource.

"Long-term" refers to longer than a 10-year period. Productivity refers to the capability of the land to provide market and amenity outputs and values for future generations. Soil and water are the primary factors of productivity, and represent the relationship between short-term uses and long-term productivity. The quality of life for future generations will be determined by the capability of the land to maintain its productivity. The land allocations and permitted activities must not significantly impair the long-term productivity of the land.

The Forest Plan should incorporate sustained yield of resource outputs while maintaining productivity of the resources. The specific direction and mitigation measures included in the Forest-wide Management Requirements ensure that long-term productivity will not be impaired by the application of short-term management practices.

Each alternative was analyzed to assure that the Forest-wide Management Requirements could be met. The alternative was changed if some aspect did not meet these requirements. Thus, in every alternative, the San Juan National Forest's long-term productivity is assured. Alternative B has the highest level of short-term uses, as reflected by the acres of vegetation treatment within the first 10-year period, and therefore, results in higher levels of short-term consequences such as visual impact and increased sedimentation. The following alternatives are shown in order of increased levels of short-term uses: A, C, D, E, G, F, H, and B.

As stated earlier, the effects of short-term or long-term uses are extremely complex and depends on management objectives and the resources to be emphasized. No alternative will be detrimental to the long-range productivity of the San Juan National Forest.

The management prescriptions and effects of the Forest Plan implementation will be monitored to provide data to assure that standards for long-term productivity will be met. Monitoring requirements and standards will apply to all alternatives and are included in Chapter IV of the Forest Plan.

ENERGY REQUIREMENTS

Estimates of energy consumption by alternative include energy used to provide goods and services on the San Juan National Forest. These estimates are gross predictions since few records or literature exist to develop energy consumption estimates for many of the Forest activities. Estimates for energy consumed were made for livestock grazing, recreation, timber activities, and road construction, reconstruction, and maintenance.

The capability of the San Juan National Forest to produce energy exists in three areas: water yield converted to hydro-electric power; coal, oil, gas, and uranium; and wood residues burned to generate energy.

The San Juan National Forest presently produces an annual average of about 2.5 million acre-feet of water. Many of the high gradient streams would have potential for small, localized hydro-electric development although the benefit-cost ratio would be low. Potential large hydro-electric reservoir sites on the Forest are very limited. Most of the water flowing off the Forest is used for agricultural and domestic use. Some water originating on the Forest is used for power generation at the Tacoma Power Plant and the Four Corners Coal Power Plant. Although water yield varies by alternative, the variation is estimated to have a minor effect on present capability of the Forest to produce energy.

The production of coal, oil, gas, uranium, and the utilization of residues burned to generate energy is uncertain under the present economy, but may become significant as other sources are diminished. Public interest has increased significantly within the past few years in these energy sources, although to date they still remain in the exploration and developmental stages. There are currently four shut-in natural gas wells on the Forest capable of production, but awaiting the construction of gathering pipelines. Similarly the shut-in carbon dioxide wells when tapped into gathering pipelines will be used in the tertiary recovery of crude oil from the oil fields around Wasson, Texas.

Table IV-62 displays the predicted energy consumption by alternative. In both providing and utilizing the goods and services from the Forest, Alternative A would result in the least energy consumption. Alternative B would result in the most energy consumption, with the other alternatives falling in the median consumption range.

NATURAL AND DEPLETABLE RESOURCE REQUIREMENTS

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The term "irreversible commitment of resources" refers mainly to actions which disturb a resource to the point that renewal can occur only over a long period of time and/or at great expense, or to non-renewable resources. Measures to protect resources that could be irreversibly affected by other resource uses were incorporated in the Forest-wide Management Requirements and apply to all alternatives.

Development of mineral resources is an irreversible commitment of resources since the minerals are no longer available for future use once they are extracted. Normally, the role of the Forest Service is to manage the surface resources to minimize adverse environmental impacts in the exploration and development of the mineral resources. The one exception is the extraction of gravel and rock for construction purposes. This can be considered an irreversible commitment of the resource although the amount of this use would be very minor and not vary significantly among alternatives.

Irretrievable commitment of resources is defined as the production or use of renewable resources that are lost because of an allocation decision. This represents opportunities foregone for the period of time that the resource cannot be used. Allocation decisions that forego the production or use of renewable resources for relatively long periods of

TABLE IV-62

Predicted Energy Use by Alternative (Trillion British thermal units -- total 50 years)

	Alternative							
	A	B	C	D	E	F	G	H
Energy required to provide goods and services	5.12	10.31	9.56	9.20	9.03	5.97	9.83	8.40
Energy required to utilize goods and services	49.27	77.55	61.92	59.57	62.25	60.74	60.42	62.15
Total Consumption	54.39	87.86	71.48	68.77	71.28	66.71	70.25	70.55

time include ski area development, road construction, and developed recreation site construction. Each of these commitments is discussed in the following paragraphs:

-Ski Area Development - The total number of acres committed to ski areas was calculated by alternative. Alternatives B, C, D, and G have the most irretrievable commitment since they allocate 18,600 acres of land for ski areas. Alternatives E and H have fewer irretrievable commitments; each alternative allocates 13,670 acres to ski areas. Alternatives A and F have the least irretrievable commitments, allocating 2,570 acres to ski areas.

-Road Construction/Reconstruction - The miles of system roads on the San Juan National Forest were determined by alternative. Alternative C has 1,981 miles of roads on the system during the planning period. Alter native B, at the opposite end of the scale, has 2,533 miles. The ranking of alternatives from the fewest irretrievable commitments to the most irretrievable commitments is: C, E, A, H, D, G, F and B.

-Developed Recreation Sites - The actual number of sites to be built and the number to be closed was used. Alternatives D and G have the least irretrievable commitments due to the closing of 12 sites. Alternative H closes five sites but expands two more. Alternative A closes three sites while Alternative B expands two sites. Alternatives C, E, and F allow for all existing sites to remain.

-Designated Wilderness Areas - The effects of the alternatives where the Wilderness Study Areas are determined suitable for wilderness have been discussed within the individual resource sections. The irretrievable commitment of resources and the outputs or values "foregone" are discussed along with a summary table in the Wilderness resource section.

These commitments are irretrievable in the sense that opportunities are foregone, rather than irreversible since they could all be reversed, although not without great expense.

Trees on steep slopes not economically accessible represent an opportunity foregone since mortality is not salvageable. The commitment is irretrievable rather than irreversible because future technological advances could make harvest of these areas economically feasible.

The difference between output levels under a given alternative and the higher levels that could otherwise be produced also represents an irretrievable commitment of resources. For example, a low level of forage use for livestock grazing or a low level of water yield could be increased in the future based on the application of different management prescriptions, but the outputs between now and then would be "lost" or not available for use. Therefore, the maintenance of future options and the present ability to utilize the resources to the fullest often conflict with one another. One purpose of Forest planning is to provide a mix of uses now and in future time periods that balance the needs of both current publics and future generations.

OTHER RESOURCE REQUIREMENTS

The levels of output for each resource are shown in detail for each resource and support element discussed previously in the section, Direct and Indirect Environmental Effects. No additional resource requirements were identified.

HISTORIC AND CULTURAL RESOURCES

The goal of the Forest Service's cultural resources management program is to preserve significant cultural resources in their field contexts. The ultimate goal is to ensure that such resources remain available on a long-term basis in reasonably unaltered field situations for such uses as research, recreation, education, and social and cultural purposes. Forest Plan alternatives can be evaluated as to their direct and indirect effects on cultural resources in relation to the stated goal; i.e., as to how well an alternative facilitates achievement of the goal.

Criteria of adverse effect on listed or eligible National Register of Historic Places properties, established in 36 CFR 800, provide a suitable basis for effects comparison (although not all of the San Juan National Forest's significant cultural resources will qualify for such listing):

-Destruction or alteration of all or part of a property.

-Isolation from or alteration of the property's surrounding environment.

-Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

-Neglect of a property resulting in its deterioration or destruction.

-Transfer or sale of a property without adequate conditions or restrictions regarding preservation, maintenance, or use.

The first four criteria are the most relevant to this analysis.

Those alternatives that allow for a high degree of land disturbing or altering activities can be considered to have a relatively higher potential for adversely affecting cultural resources, directly or indirectly, than alternatives that minimize such activities. However, the adverse effects potential of even a high disturbance alternative will be significantly reduced, and often totally eliminated, by planning activities to avoid areas of high cultural resource sensitivity and compliance with standards and guidelines contained in the Forest-wide Management Requirements.

The alternatives where the Wilderness Study Areas are determined suitable for wilderness would help preserve archaeological or historical resources against potentially damaging activities caused by motorized vehicle activities and land altering management projects which could take place in the alternatives where they are determined to be unsuitable.

The Forest-wide Management Requirements ensure that all of the proposed alternatives would be compatible with the cultural resource management program goal. However, as shown in the assignment of effects ratings, Alternative A has the highest compatibility with the cultural resource management goal as it requires the least amount of ground disturbing actions; i.e., cultural resources support costs should be the least in this alternative. Conversely, Alternative B would have the lowest compatibility.

The American Indian Religious Freedom Act requires federal agencies to evaluate their policies and procedures in consultation with native traditional religious leaders in order to determine appropriate changes necessary to protect and preserve Native American religious cultural rights and practices. Because of the lack of knowledge of what traditional native religions constitute, requests for consultation have been made to members of Indian tribes to help define those needs. To date, no responses have been received nor criteria defined. Therefore, it is not possible to evaluate the significance of Forest Service management activities on Native American religious practices.

ADVERSE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Implementation of any of the alternatives will result in some adverse environmental effects that cannot be avoided. However, application of the Forest-wide Management Requirements is intended to limit the extent and duration of these effects.

Activities occurring on the San Juan National Forest will cause some degree of environmental impact. The degree or severity of the adverse effects can be minimized by adhering to the direction in the management prescriptions, but some impact generally cannot be avoided if any management activities occur. These effects include:

Scenic Values - Silvicultural and road construction activities cause a temporary change in the landscape that is normally distasteful to observers. Debris on the ground, understory vegetation disturbance, dust, and noise are normally experienced as a result of such activities. These are short-term effects.

Fire Management - During the short-term period of logging and thinning operations, there are temporary increases in fire hazards from waste material left on the ground in the form of unmerchantable trees, tops, limbs, and needles.

Recreation - Project activities such as timber sales and road construction temporarily disrupt recreation uses by reducing or changing the type of recreation use that previously occurred on the area.

Livestock Forage - Timber harvesting, hunting, and fuelwood cutting may have a short-term disruptive effect on proper livestock distribution and forage utilization. There may also be a short-term decrease in available forage because of disturbance by logging equipment and accumulations of slash.

Transportation - Construction and reconstruction of roads affects aesthetics, erosion, wildlife, noise levels and the number of people using an area.

Air Quality - Silvicultural, road construction and prescribed burning activities cause slight temporary changes in air quality. These changes, which occur only during the actual construction, harvesting and burning, will be in the form of increased smoke and dust in the air.

Water Quality - Man-caused sediment is considered the most prevalent polluting material in Forest streams. Project activities such as vegetation treatment may contribute sediment to adjacent streams due to inadequate road drainage, scarification and skid trails.

Cultural Values - There could be a disruption of prehistoric or historic evidence of early man's occupancy on the Forest.

Wildlife - Increased human activities in project areas may temporarily displace wildlife. Roads may have a longer impact on wildlife due to human activities associated with new access into areas previously unroaded and improved access into areas that previously had low standard non-surfaced roads.

Community Values - With a long-term increase in recreation use and especially downhill skiing, communities with rural mountain lifestyles could be adversely effected by increased population and costs of living.

Mitigation measures are included in Forest-wide Management Requirements and management prescriptions in all alternatives. They are intended to mitigate the adverse effects that cannot be avoided.



v. list of preparers

CHAPTER V

LIST OF PREPARERS

The San Juan National Forest Land and Resource Management Plan and Environmental Impact Statement was prepared by a team of individuals of varied specialties and backgrounds. Throughout the planning process, an interdisciplinary approach was used to develop the proposed plan and alternatives to it. The following are those who helped in the preparation of the documents.

Richard A. Bell - Pine District Recreation and Lands Staff Specialist
B.S. Forestry

Seventeen years experience as Forester on four Ranger Districts; served as Pine District liaison to the Interdisciplinary Team; helped apply alternatives to the ground.

H. E. Bond - Range and Remote Sensing Staff Specialist
B.S. Forest Management; M.S. Range Management

Two years in range for Soil Conservation Service; two years in Agricultural Research Service in range and soils; four years in range, timber, minerals, and lands; twelve years as District Ranger; eight years in Forest Supervisor's Office in planning, range, and remote sensing.

Interdisciplinary Team Member; provided range resource information for the planning process.

Douglas L. Brunell - Computer Specialist
B.S. Geology

Six years as Logician, Digital Computer Operator, Systems Analyst, and Computer Programmer; fourteen years experience as Computer Systems Analyst for Bureau of Land Management, Defense Nuclear Agency, and Defense Logistics Service Agency; one year on Forest Planning Team.

Served as Computer Analyst for computer systems applicable to the Forest Plan.

Chuck Calkins - Fire and Special Uses Staff Specialist
B.S. Biology; M.S. Forest Management

Ten years on Districts; nine years as District Ranger; five years in Supervisor's Office as Fire and Special Uses Staff Specialist.

Interdisciplinary Team Member; provided fire, air quality and special uses information for the planning process.

Lowell Thomas Cartwright - Pine District Ranger
B.S. Forest Management; M.S. Wildlife Management

One year in Supervisor's Office as Forester; two years on District as Forester; two years in Supervisor's Office as Wildlife Biologist, two years as District Ranger.

Developed management concerns as a member of the Management Team; organized and conducted District level of public involvement; provided direction for "on-the-ground" application of the Forest Plan; directed alternative allocations for the Pine District.

Daniel K. Chisholm - Program Officer for Planning
B.S. Forest Management; M.S. Forest Management

Six years as District Forester and Resource Assistant; two years as Supervisor's Office Staff in insect and disease control; six years as District Ranger; three years as Forest Planning Team Leader; four years as Program Officer.

Member of Management Team with overall responsibility for the Land and Resource Management Plan.

Robert Clauson - Timber Sale Staff Specialist
B.S. Forest Management

Eleven years of District experience; two years of Regional Office experience; twelve years as Supervisor's Office Timber Sale Staff Specialist.

Member of Interdisciplinary Team; provided information on timber sale economics and logging systems for the planning process.

Dave Cook - Wildlife Staff Specialist
B.S. Wildlife Management

Six years as Range Conservationist; fourteen years as Wildlife Biologist in Supervisor's Office.

Member of Interdisciplinary Team; provided wildlife and fish information for the planning process.

John Cooley - Program Officer for Resources
B.A., B.S. Forestry, M.S. Forestry

Twenty-five years experience as Regional Hydrologist, Regional Office Branch Chief, and Program Officer.

Member of Management Team; helped formulate management concerns; assisted in reviews of steps in planning process; coordinated input of resource specialists.

Robert L. Davis - Hydrology Staff Specialist (Presently with Arapaho-Roosevelt National Forests)
B.S. Watershed Science; M.S. Forest Economics

Six years experience as Forest Hydrologist at Supervisor's Office level.

Member of Interdisciplinary Team; helped develop process criteria and data collection for water resource.

Ronald C. Doering - Realty Staff Specialist
B.S. Forestry

Seven years with Bureau of Land Management as Forester/Realty Specialist; three months in Supervisor's Office as Realty Specialist.

Member of Interdisciplinary Team; provided lands information for the planning process.

Wayne Dunn - Animas District Recreation and Lands Staff Specialist
B.S. Forest Resources Management

Thirteen years on District in all resources; three years in recreation and lands on District.

Served as Animas District liaison to Interdisciplinary Team, worked on all District level planning tasks from data collection through application of alternatives on the ground.

Neil Edstrom - Wilderness and Lands Staff Specialist (Retired)
B.S. Forest Management

Twenty-five years on Districts (twenty-two as District Ranger); one year in Regional Office timber survey; two years in Supervisor's Office as Wilderness, Ski Area Planning, and Lands Staff Specialist.

Member of Interdisciplinary Team; provided wilderness information for the planning process.

Donald Foth - Dolores District Ranger
B.S. Forestry

Ten years as Timber, Range, and Recreation Staff on four Districts; seven years as District Ranger on three Districts.

Developed management concerns as a member of the Management Team; responsible for District level of public involvement; provided direction for "on-the-ground" application of the Forest Plan; directed alternative allocations for the Dolores District.

Allan K. Green - Forest Planner
B.S. Forestry

Two years as Research Forester; twelve years as District Staff; four years in planning in Supervisor's Office.

Responsible for coordinating, directing and reviewing work and products resulting in the Forest Plan and Environmental Impact Statement. Coordinated and reviewed work completed by the Interdisciplinary Team.

Peter E. Hager - Program Officer for Services/Support (Presently with Southern Region)
B.S. Civil Engineering

Seven years as Construction and Preconstruction Engineer, eleven years as Forest Engineer, three years as Program Officer.

Member of Management Team; reviewed planning actions; helped formulate management concerns.

Charles W. Hardy - Program Officer for Administration
B.S. Business, M.B.A. Business Administration

Eighteen years experience in Forest Service Administration at various levels.

Member of Management Team; reviewed planning actions; coordinated support services for the planning effort.

Richard A. Hepler - Minerals Staff Specialist
B.S. Geology

Three years in private industry; three years Department of Navy; five years Department of Commerce; eleven years with Forest Service.

Member of Interdisciplinary Team, provided mineral resource information for the planning process.

Howard R. Hittenrauch - Silviculture Staff Specialist
B.S. Forest Management

Six years as Forester; eighteen years as Silviculturist in Supervisor's Office.

Member of Interdisciplinary Team; provided silviculture and timber management information for the planning process.

Don Hoffheins - Soil Scientist
B.S. Soil Science

Five years as Soil Scientist on Districts and Supervisor's Office.

Mancos District liaison to Interdisciplinary Team, helped develop and delineate capability areas.

Terry Hughes - Soil Staff Specialist
B.S. Forestry, Soils Minor

Four years in soil survey with Soil Conservation Service; six years as Forest Soil Scientist at Supervisor's Office level.

Member of Interdisciplinary Team; helped develop and delineate capability areas; provided soils information for the planning process.

Ted LaMay - Animas District Ranger
B.S. Timber Management

One year in Regional Office Timber Survey; two years in timber in Supervisor's Office; two years as Assistant District Ranger; twenty years as District Ranger.

Developed management concerns as a member of the Management Team; organized and conducted District level of public involvement; provided direction for "on-the-ground" application of the Forest Plan; directed alternative allocations for the Animas District.

Robert Lillie - Program Officer for Services/Support
B.S. Forest Management

Ten years experience as District Ranger; three years in Job Corps administration; two and one-half years as liaison between Tuskegee Institute and Southern Forest Experiment Station; one year as Program Officer.

Member of Management Team; reviewed steps in planning process; coordinated input from resource specialists.

Doyne Mayberry - Lands Staff Specialist (Retired)
B.S. Forest Management

Four years on District Staff; twenty-two and one-half years as District Ranger, two and one-half years as Supervisor's Office Lands Staff.

Member of Interdisciplinary Team; provided lands information for the planning process.

Henry R. Miller - Pagosa District Recreation and Lands Staff Specialist
B.S. Forest Management; M.S. Forest Management

Two years in timber management; three years as Recreation and Timber Forester on District; two years as Recreation and Lands Forester on District; two years as Recreation, Lands and Minerals Supervisory Forester on District.

Helped develop management prescriptions; served as Pagosa District liaison to Interdisciplinary Team; assisted with minerals input.

Dennis Neill - Public Information Staff Specialist
B.A. Communications

Three years as Public Information Specialist in Washington, D.C.; two and one-half years as Public Information Specialist in Forest Service Research; one and one-half years as freelance writer/editor; two years as Public Information Officer in Supervisor's Office.

Responsible for public involvement and mailing list; assisted in writing planning documents, Forest Plan and Environmental Impact Statement.

Richard Ostergaard - Landscape and Wilderness Management Staff Specialist
B.L.A. Landscape Architecture

Two years as Architectural Aid; three years as Recreation and Lands Staff Officer on District; seven years as Forest Landscape Architect in Supervisor's Office.

Member of Interdisciplinary Team; provided information on visual and wilderness resources for the planning process.

Andrew G. Raby - Geologist
B.S. Geology; M.S. Geology

One year with U.S. Geological Survey and private industry; one year as Geologist in Supervisor's Office.

Provided assessment of lands unsuitable for coal mining; assisted in minerals resource information for the planning process.

Mauricio Ribera - Transportation Planning and Engineering Staff Specialist
B.A. Math

Ten years experience as Civil Engineer on four National Forests.

Member of Interdisciplinary Team; provided engineering and facility information for the planning process.

Paul S. Roth - Dolores District Timber Management Staff Specialist (Retired)
B.S. Forest Management

Ten years as District Ranger; ten years as District Timber Management Staff Specialist; two years as Supervisor's Office Staff.

Helped develop management prescriptions; served as Dolores District liaison to Inderdisciplinary Team.

Mark Story - Hydrology Staff Specialist
B.S. Wildlife Management, M.S. Watershed Management

Seven years as Hydrologist on three Forests.

Member of Interdisciplinary Team; provided water resource information for the planning process.

Paul C. Sweetland - Forest Supervisor
B.S. Civil Engineering, M.S. Natural Resource Management

Three years construction and preconstruction engineering; five years engineering management, Assistant Forest Engineer and Forest Engineer; two years as Job Corps Center Director; three years in charge of Land Management Planning for the Southern Region; five years Deputy Forest Supervisor; four years as Forest Supervisor.

Provided overall direction and guidance for Forest Planning effort; recommended approval of final products throughout the planning process.

Jack G. Troyer - Mancos District Ranger (Presently with White River National Forest)
B.S. Watershed Management

Two years as Forest Hydrologist; six years as Land Management Planner; four years as District Ranger.

Developed management concerns as a member of the Management Team; organized and conducted District level of public involvement.

William Wegert - Economics and Operations Research Staff Specialist
B.S. Forest Biology; M.S. Forest Management

One year as District Forester; one year as Supervisor's Office Forester; two years Supervisor's Office Planning Staff.

Supervised the Forest Plan Linear Program (FORPLAN) effort; provided socio-economic information for the planning process.

Bernie Weingardt - Mancos District Ranger
B.S. Forest Management Science

One year Forestry Technician on District; six years Timber and Fire Forester on Districts; two years as District Ranger.

Developed management concerns as a member of the Management Team; organized and conducted District level of public involvement; provided direction for "on-the-ground" application of the Forest Plan; directed alternative allocations for the Mancos District.

Walter D. Werner - Pagosa District Ranger
B.A. Forest Recreation

Four years as Forester on District; three years Program Auditor with Office of Inspector General of the U.S. Department of Agriculture; four years in special projects and Forest Planning in Supervisor's Office; eight years as District Ranger.

Developed management concerns as a member of the Management Team; organized and conducted District level of public involvement; provided direction for "on-the-ground" application of the Forest Plan; directed alternative allocations for the Pagosa District.

Lorrie Stehle West - Soil Scientist (No longer with the Forest Service)
B.S. Soil Science

One and one-half years in Forest Service Research; one year on District and four years in Supervisor's Office as Soil Scientist; two years on Planning Staff in Supervisor's Office.

Assisted in Interdisciplinary Team coordination; assisted in the development of Planning Actions 1, 2, and 4; supervised development of R2MAP and System 2000 data systems and responsible for writing Planning Action 3, Planning Data Base.

Robert York - Archaeology Staff Specialist
B.S. Anthropology; M.A. Anthropology

Four years as Museum Staff Archaeologist; four years as BLM Archaeologist/Cultural Resources Specialist; three years as Forest Archaeologist.

Member of Interdisciplinary Team; supplied data on cultural resources for the planning process.

Karl Zeller - Recreation Staff Specialist
B.S. Forestry

Four years as District Forester; fourteen years as District Ranger; six years in Supervisor's Office as Recreation Staff Specialist.

Member of Interdisciplinary Team; provided recreation and winter sports information for the planning process.

Sally Zwisler - Biological Technician
B.S. Forest and Wildlife Biology

Three years experience on Districts and in Supervisor's Office as Technician and Biological Aid.

Transferred capability areas from aerial photos to quad maps; helped develop R2MAP layers; updated and organized System 2000 data base; responsible for preliminary and final maps for the Forest Plan.

Acknowledgements

-The Public Lands Citizen's Advisory Committee, and especially Dr. Carroll Petersen, for extensive public commentary.

-Alice Wilson for untiring clerical support.

-Hsu Ho Chung - Consultant on data base management and ecological information for computer modeling.

-Bio-aids; Judy Baumgardner, Carrie Bida, Rose Chilcoat, Ross Denny, Allen Forky, Michele Glover, Don Hicks, Jim Paradiso, Steve Rauworth, Doris Salazar, Juanita Sauvage-Sherer, Valerie Staley, and Laura Stransky.

-Computer Specialists; William Swisher, David Anderson, Eloisa Trujillo.

-Clerks and resource trainees: Gloria Alvarado, Pam Atkinson, Sandy Campbell, Connie Collett, Mary Ann Fama, Inez Ferrari, Sally Huff, Jim Herrig, Alice Johns, Linda Knipp, Judy Martin, Teresa Martinez, Debbi Nall, Brian Parker, Helen Seidle, Trista Todd, Della Vigil, Nettie Wells.

-Plus many other individuals from the Forest Service, other government agencies and the private sector.



vi. consultation with others & mailing list

CHAPTER VI

CONSULTATION WITH OTHERS AND MAILING LIST

CONSULTATION WITH OTHERS

The Forest began an active program of public involvement and consultation with organizations; local, State and Federal agencies; recreation, ranching, mining and timbering interests; and other formal groups and individuals when the planning effort was initiated in 1979. Public responses from 15 past planning projects were first surveyed to develop an initial list of issues; and Forest employees were surveyed for management concerns.

The initial list of issues and concerns was sent to everyone on the Forest mailing list, approximately 1500 names, for review and comment. About 600 responded. Additional issues were generated through personal contacts and meetings with various groups. In mid-1980, more information was sent to those on the mailing list in the form of a "Forest Planning Update," listing all the public issues and reviewing progress to date on the Forest Plan. Two more issues of the Update have been mailed, generating several hundred responses to issues, such as oil and gas leasing in wildernesses and wilderness study areas.

Federal, State and local government entities, including Indian Tribes, have been informed and consulted throughout the San Juan National Forest's land management planning effort. Federal agencies consulted include the U. S. Department of the Interior's National Park Service, Bureau of Land Management and Bureau of Reclamation; the U. S. Department of Agriculture's Soil Conservation Service, and the United States Air Force. United States Senators and Representatives from Colorado have been notified throughout the planning process as well.

The Colorado State Forest Service and the Colorado Division of Wildlife have been involved, both formally and informally, more than other State agencies. Local government entities involved in the planning process from the beginning include the County Commissioners of the ten counties containing lands of the San Juan National Forest and the Southern Ute and Ute Mountain Ute Tribal Councils. The following mailing list details all Federal, State and local government offices that have received information during the planning process.

In addition, Forest officers have appeared on local radio and television programs several times to discuss the planning efforts, and have spoken to such groups as Lions Club, Daughters of the American Revolution, and Audubon Society. A series of open houses were held at District Offices during the alternative formulation stage. Letters were written to local government agencies such as County Commissioners, Indian Tribes and municipal planners during alternative formulation. Coverage in the five county area media has been good; especially on the open houses. Groups that have regularly been consulted include the Public Lands Citizens' Advisory Committee, San Juan National Forest Grazing Advisory Board, the San Juan Chapter of the Audubon Society, the Colorado Open Space Council and the American Wilderness Alliance.

MAILING LIST

Copies of the draft Environmental Impact Statement and proposed Forest Plan or the summary were distributed to the following individuals, organizations and agencies. Those individuals specifically requesting copies of the draft EIS and Forest Plan were mailed a copy. Those individuals requesting information on the Forest Plan were mailed the summary only.

FEDERAL:

Honorable William L. Armstrong, United States Senate, Washington, D.C.
Honorable Gary Hart, United States Senate, Washington, D.C.
Honorable Ray Kogovsek, House of Representatives, Washington, D.C.
Honorable Ken Kramer, House of Representatives, Washington, D.C.
Honorable Patricia Schroeder, House of Representatives, Washington, D.C.
Honorable Tim Wirth, House of Representatives, Washington, D.C.
Agriculture Stabilization and Conservation Service, Cortez, CO
Bureau of Indian Affairs, Ignacio, CO
Bureau of Indian Affairs, Ute Mountain Ute Agency, Towaoc, CO
Bureau of Land Management, Denver, CO
Bureau of Land Management, Durango, CO
Bureau of Land Management, Montrose, CO
Bureau of Reclamation, Cortez, CO
Bureau of Reclamation, Durango, CO
Farmer's Home Administration, Durango, CO
Mesa Verde National Park, Mesa Verde, CO
National Park Service, Denver, CO
Small Business Administration, Denver, CO
U. S. Environmental Protection Agency, Denver, CO
U. S. Geological Survey, Denver, CO
U. S. Geological Survey, Durango, CO

STATE:

Assistant to the Governor for Environmental Affairs, Denver, CO
Board of Land Commissioners, Denver, CO
Colorado Agricultural Commission, Denver, CO
Colorado Department of Education, Denver, CO
Colorado Department of Highways, Denver, CO
Colorado Department of Highways, Durango, CO
Colorado Department of Local Affairs, Durango, CO
Colorado Department of Natural Resources, Denver, CO
Colorado Division of Parks and Outdoor Recreation, Denver, CO
Colorado Division of Planning, Denver, CO
Colorado Division of Water Resources, Durango, CO
Colorado Division of Wildlife, Denver, CO
Colorado Division of Wildlife, Durango, CO
Colorado Geological Survey, Denver, CO
Colorado Land Use Commission, Denver, CO
Colorado Oil and Gas Conservation Commission, Denver, CO
Colorado State Forest Service, Durango, CO
Colorado State Forester, Fort Collins, CO
Colorado State Historical Society, Denver, CO
Department of Forest and Wood Science, Colorado State University, Fort Collins, CO
District Wildlife Manager, Allison, CO
District Wildlife Manager, Bayfield, CO
District Wildlife Manager, Chimney Rock, CO
District Wildlife Manager, Ignacio, CO
District Wildlife Manager, Pagosa Springs, CO
Division of Water Resources, Denver, CO
Honorable Richard Lamm, Governor of Colorado, Denver, CO
Information Officer, Colorado Division of Wildlife, Montrose, CO

STATE: (cont.)

Representative Robert DeNier, Durango, CO
Senator Dan Noble, State Capitol Building, Denver, CO
San Juan Basin Research Center, Hesperus, CO
Southwestern District Water Commissioner, Pagosa Springs, CO
State Water Commissioner, Mancos, CO

REGIONAL:

Animas Regional Planning Commission, Durango, CO
San Juan Regional Planning Commission, Durango, CO
Upper San Juan Regional Planning Commission, Pagosa Springs, CO

LOCAL:

Archuleta County Sheriff, Pagosa Springs, CO
Bayfield Town Council, Bayfield, CO
Board of County Commissioners, Archuleta County
Board of County Commissioners, Conejos County
Board of County Commissioners, Dolores County
Board of County Commissioners, Hinsdale County
Board of County Commissioners, La Plata County
Board of County Commissioners, Mineral County
Board of County Commissioners, Montezuma County
Board of County Commissioners, Rio Grande County
Board of County Commissioners, San Juan County
Board of County Commissioners, San Miguel County
City Manager, Durango, CO
City-County Planner, Dolores County
Cortez City Council, Cortez, CO
Cortez Public Schools, Cortez, CO
County Extension Agent, Pagosa Springs, CO
County Planner, Montezuma County, Cortez, CO
County Road Superintendent, Mancos, CO
County Sheriff, Durango, CO
Dolores County Sheriff, Dove Creek, CO
Dolores Town Council, Dolores, CO
Dove Creek Town Council, Dove Creek, CO
Durango City Council, Durango, CO
Hinsdale County Sheriff, Lake City, CO
Ignacio City Council, Ignacio, CO
La Plata County Planner, Durango, CO
La Plata County Social Service, Durango, CO
Mancos Town Council, Mancos, CO
Mancos Water Conservancy District, Mancos, CO
Mayor, Mancos, CO
Mineral County Land Administrator, Creede, CO
Mineral County Sheriff, Creede, CO
Montelores Planning Group, Cortez, CO
Montezuma County Sheriff, Cortez, CO
Pagosa Public Schools, Pagosa Springs, CO
Pagosa Springs Town Board, Pagosa Springs, CO
Pine River Irrigation District, Bayfield, CO
Rico Town Council, Rico, CO
San Juan Basin Health Unit, Durango, CO
San Juan Basin RC&D, Durango, CO
San Juan County Sheriff, Silverton, CO
School District No. RE-4A, Dolores, CO
School District No. 1, Silverton, CO
School District No. 10, Bayfield, CO
School District No. 11, Ignacio, CO
School District No. 9-R, Durango, CO
Silverton Town Council, Silverton, CO
Southwest Water Conservancy District, Durango, CO
Southwest Water Conservancy District, Mancos, CO
Water Commissioner, Ignacio, CO

LIBRARIES:

Conservation Library, Denver Public Library
Cortez Public Library, Cortez, CO
Documents Librarian, Colorado State University, Fort Collins, CO
Dolores Public Library, Dolores, CO
Durango Public Library, Durango, CO
Fort Lewis College Library, Durango, CO
Idaho State University Library, Pocatello, ID
Mancos Public Library, Mancos, CO
Pagosa Springs Library, Pagosa Springs, CO
Silverton Public Library, Silverton, CO

ORGANIZATIONS:

American Wilderness Alliance, Denver, CO
Archuleta County Stockgrowers' Assn., Pagosa Spring, CO
Vallecito Chamber of Commerce, Bayfield, CO
Chamber of Commerce, Cortez, CO
Chamber of Commerce, Durango, CO
Chamber of Commerce, Pagosa Springs, CO
Chicago Mountaineering Club, Naperville, IL
Club 20, Grand Junction, CO
Colorado Cattlemen's Assn., Denver, CO
Colorado Counties, Inc., Denver, CO
Colorado Federation of Women's Clubs, Brighton, CO
Colorado Four Wheel Drive Clubs, Inc., Fort Collins, CO
Colorado Guide and Outfitters Assn., Grand Junction, CO
Colorado Mining Assn., Denver, CO
Colorado Mountain Club, Denver, CO
Colorado Mountain Trails Foundation, Littleton, CO
Colorado Open Space Council, Denver, CO
Colorado Open Space Council, Montrose, CO
Colorado Outward Bound School, Denver, CO
Colorado Wildlife Federation, Inc., Hygiene, CO
Colorado Woolgrower's Assn., Denver, CO
Continental Divide Trail Society, Washington, D.C.
Federal Timber Purchaser's Assn., Denver, CO
Four Corners Environmental Research Institute, Durango, CO
Four Corners Miner's and Prospector's Assn., Hesperus, CO
La Plata County Cattlemen's Assn., Durango, CO
Montelores Citizens Resource Forum, Dolores, CO
National Audubon Society, Boulder, CO
National Campers & Hikers Assn., Lakewood, CO
National Camping and Hiking Assn., Pueblo, CO
National Council of Public Land Users, Grand Junction, CO
National Wildlife Federation, Boulder, CO
Prairie Audubon Society, Hastings, NB
Rocky Mountain Center on Environment, Denver, CO
Rocky Mountain Oil and Gas Assn., Denver, CO
Sierra Club - Southwest Office, Santa Fe, NM
The Arkansas Valley Audubon Society, Coaldale, CO
Trout Unlimited - Colorado, Denver, CO
United States Ski Association, Park City, UT
Wilderness Society, Denver, CO
Wilderness Study Group, University of Colorado, Boulder, CO
Wilderness Study Society, Bernalillo, NM
Wilderness Workshop, Colorado Open Space Council, Denver, CO
Wildlife Management Institute, Portland, OR
Wildlife Preservation Society, Sterling, MI

PRESS:

Albuquerque Journal and Tribune, Albuquerque, NM
Colorado Springs Gazette - Telegraph, Colorado Springs, CO
Colorado Springs Sun, Colorado Springs, CO
Cortez Sentinel, Cortez, CO
Daily Sentinel, Grand Junction, CO
Daily Times, Farmington, NM
Denver Post, Denver, CO
Durango Herald, Durango, CO
Forest Contractor's Weekly, Albuquerque, NM
High Country News, Lander, WY
KBTV - TV, Denver, CO
KDGO Radio, Durango, CO
KDRW Radio, Silverton, CO
KDUR Radio, Durango, CO
KIQX Radio, Durango, CO
KISZ Radio, Cortez, CO
KIUP - KRSJ Radio, Durango, CO
KIVA - TV, Farmington, NM
KKTV - TV, Colorado Springs, CO
KMGH - TV, Denver, CO
KOA - TV, Denver, CO
KOAA - TV, Pueblo, CO
KPAG Radio, Pagosa Springs, CO
KREX - TV, Grand Junction, CO
KREZ - TV, Durango, CO
KRMA - TV, Denver, CO
KVFC Radio, Cortez, CO
KWGN - TV, Denver, CO
Mancos Times-Tribune, Mancos, CO
Mineral County Miner and South Fork Times, Creede, CO
Montrose Daily Press, Montrose, CO
Pagosa SUN, Pagosa Springs, CO
Pine River Valley News Digest, Bayfield, CO
Pueblo Chieftain and Star Journal, Pueblo, CO
Rocky Mountain News, Denver, CO
Santa Fe New Mexican, Santa Fe, NM
Silverton Standard, Silverton, CO
Telluride Times, Telluride, CO
Today Newspaper, Durango, CO

INDUSTRY:

Amalia Lumber Company, Costilla, NM
AMAX Exploration, Golden, CO
Amoco Production Co., Denver, CO
Anaconda Company, Denver, CO
Atlantic Richfield Company, Dallas, TX
Atlantic Richfield Company, Denver, CO
Bayfield Beam & Timber Co., Bayfield, CO
Bear Staller Ranch, Pagosa Springs, CO
Best Log Industries, Cortez, CO
Bigbee Bros. Cattle Co., Chromo, CO
CF&I Steel Corporation, Pueblo, CO
Colorado Timber Company, Nederland, CO
Craig Cattle Co., Durango, CO
Cugnini Land and Cattle Co., Durango, CO
Dalton Land and Cattle Co., Durango, CO
Dolores Post and Pole, Dolores, CO
Duke City Lumber, Albuquerque, NM
Durango Ski Corporation, Durango, CO
Durango-Silverton Narrow Gauge Railway, Durango, CO
Eaton International, Pagosa Springs, CO
Edward Hines Lumber Company, Denver, CO
El Rancho Pinoso, Inc., Hobbs, NM
Evergreen Lumber Co., Inc., Chama, NM
Formwalt Ranch, Inc., Pagosa Springs, CO
Fortune Oil Company, Salt Lake City, UT
Great Scot Timber Co., Bayfield, CO

INDUSTRY: (cont.)

Halls Ranches, Monticello, UT
Hansen Lumber Company, Santa Fe, NM
High Valley Lumber, Del Norte, CO
Homestake Mining Co., Gunnison, CO
Homestake Mining Company, San Francisco, CA
Homestead Builders, Ignacio, CO
Homestead Cattle Ranch, Ltd., Mancos, CO
Hott Ranches, Inc., Pagosa Springs, CO
Hudspeth Corporation, Durango, CO
Huntington Ranches, Hesperus, CO
Instant Lumber and Shakes, Cortez, CO
J. H. Ranch, Dove Creek, CO
K. S. Summers Livestock, Inc., Monticello, UT
Kaibab Industries, Phoenix, AZ
Kaime Land and Cattle Co., Farmington, NM
Keller Ranch Partnership, Montrose, CO
Lake Haven Resort, Bayfield, CO
Lake Mancos Guest Ranch, Mancos, CO
Lemon Ranches, LTD, Durango, CO
Lewis Ranches, Cortez, CO
Lone Cone Livestock Co., Norwood, CO
Macht Ranch, Inc., Pagosa Springs, CO
Meadow Creek Ranches, Montrose, CO
Mountain Gravel and Construction, Dolores, CO
Navajo Forest Products Industries, Navajo, NM
New Mexico Log Homes, Regina, NM
New Mexico Cattle Grower's Assn., Albuquerque, NM
Nicolas Brothers, Montrose, CO
Ohio Match Company, Mancos, CO
Pine Springs Ranch, Property Owners Assn., Bayfield, CO
Ponderosa Timber Co., Dolores, CO
Public Service Company of Colorado, Denver, CO
R&R Logging, Ignacio, CO
Ramsey Ranches, Inc. Cortez, CO
Rico Argentine Mining Co., Rico, CO
RJAD Co., Durango, CO
Robb Ranches, Inc., Mancos, CO
Rolisch Lumber Company, Creede, CO
Saddleback Ranch, Pagosa Springs, CO
Sambrito Cattle Co., Ignacio, CO
Southwest Forest Industries, Flagstaff, AZ
Southwest Forest Industries, Phoenix AZ
Southwest Forest Industries, South Fork, CO
Steward Ranch, Durango, CO
Stoner Creek Inc., Dolores, CO
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VIII. appendices

APPENDIX A

GLOSSARY

Acre Foot - A water volume measurement equal to the amount of water that would cover one acre to a depth of one foot (43,560 cubic feet or 325,851 gallons).

Aerial Logging - A system for hauling timber from the stump to a collecting point which employs aerial means of transportation, e.g., balloons, helicopters, or cables; as opposed to ground (tractor) skidding.

Aerial Stocking - The use of airplanes or helicopters to introduce fish into high mountain lakes.

Alienated Mineral Rights - Ownership of the mineral rights is by someone other than the surface rights owner.

Alternative - One of several policies, plans or projects proposed for decision making.

Analysis Area - One or more sites combined for the purpose of analysis in formulating alternatives and estimating various impacts and effects.

Analysis of Management Situation (AMS) - A determination of the ability of the planning area to supply goods and services in response to society's demand for those goods and services.

Animal Unit Month (AUM) - The quantity of forage required by one mature cow (1000 pounds) or the equivalent for one month.

Animas-La Plata Project - Proposed water project transferring water from the Animas River to the La Plata River.

Aquatic - Pertaining to standing and running water in streams, rivers, lakes, and reservoirs.

Archaeological and Historical Sensitivity - See "Sensitivity Level."

Arches - Device used in skidding to keep the front end of the log off the ground.

Arterial Roads - Primary travel routes that provide service to a large land area and which usually connect with public highways or other Forest Service arterial roads.

AUM - See "Animal Unit Month."

Background (Visual Distance Zone) - The distant part of a landscape; surroundings, especially those behind something, and providing harmony and contrast; area located from 3 to 5 miles to infinity from the viewer.

Basal Area - Measurement of how much of a site is occupied by trees. It is determined by measuring the square feet of the diameter of all the trees in an area at breast height (4.5 feet).

Base Sale Schedule - A schedule in which the planned sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade of the planning period and this planned sale and harvest for any decade is not greater than the long-term sustained-yield capacity. (This definition expresses the principle of non-declining flow.)

Baseline Water Yields - Estimate of what water yield would be in the absence of any man-caused modifications in the precipitation-runoff process.

B/C Values - See "Benefit/Cost Ratio."

Benchmark - A category of Forest Planning Alternatives used to establish standards by which to compare alternatives considered in detail. Benchmark Alternatives include minimum level, minimum acceptable level, maximum resource levels, and maximum present net value levels.

Benefit/Cost Ratio - The total discounted benefits of an activity divided by the total discounted costs.

Big Game - The larger species of wild animals that are hunted, such as elk, deer, bighorn sheep, and mountain goats.

Biological Potential - The maximum production of a selected organism that can be attained under optimum management.

BLM - Bureau of Land Management.

Board Foot - Measure of an amount of timber equivalent to a piece 12" X 12" X 1". The boards bought at a lumber store are somewhat smaller because they have been planed or made smooth.

Broadcast Seeding - The scattering of seed more or less evenly over a whole area.

Brush Raking - The uprooting and piling of brush with a tractor or bulldozer to reduce competition between the brush and the favored species.

Buffer-Filter Strip - A designated land or water area, along the perimeter of some land use, whose own use is regulated so as to resist, absorb, or otherwise preclude or control unwanted development or other intrusions into areas beyond the buffer.

Cable Logging - A method for transporting logs from stumps to collecting points which utilizes a cable system as the main device for moving them.

Canopy - The more or less continuous cover of branches and foliage formed collectively by the crown of adjacent trees and other woody growth.

Capability Area - An area of land delineated for the purpose of estimating responses to various management practices, resource values, output coefficients, and multi-resource or joint production functions. Capability areas may be synonymous with ecological land units, ecosystems, or land response units. Capability areas are the single geographic delineations used to describe characteristics of the land and resources in integrated forest planning.

Capable Range - Land that produces forage for animal consumption without impairing other forage values; generally considered as land that is not being cultivated.

Carrying Capacity - The maximum stocking rate possible without inducing damage to vegetation or related resources expressed in AUM's, may vary from year to year due to fluctuating forage production.

CEQ - Council on Environmental Quality.

CFR - Code of Federal Regulations.

Chemical Water Quality - Measurements of chemical parameters (alkalinity, dissolved oxygen, dissolved iron, etc.) used to describe the quality of water.

Clearcutting - A regeneration method used to establish even-age stands whereby all trees are removed in one harvest.

Coal Unsuitability Criteria - Regulations, developed by the Bureau of Land Management, which use the ability of an area's surface resources to accept or absorb the impacts of coal mining activities as a means to determine suitability or unsuitability of the area for coal mining.

Collector Roads - Roads that serve smaller land areas and are usually connected to Forest arterial roads or public highways. They collect traffic from local roads and terminal facilities. Collector roads are operated for constant use.

Commercial Forest Land - See "(Forest Land) Capable."

Concession Permit - A permit which authorizes private individuals or corporations to operate Forest Service owned facilities as a commercial profit-making venture.

Condemnation - In real property law, the process by which property of a private owner is taken for public use, without his consent, but requiring payment of just compensation.

Constant Road - (Constant entry road) A road developed and operated for continuous or annual recurrent service.

Constrained Maximum Level Alternative - The highest level of a particular output that could be produced over time, subject to the production of minimum acceptable levels for all other outputs.

Constraint - A quantification of the minimum or maximum amount of an output or cost that could be produced or incurred in a given time period.

Contracts, "8A" - Contracts set-aside for minority, small business.

Controlled Burn - See "Prescribed Fire."

Cord - A unit of gross volume measurement for stacked round or split wood. A standard cord is 4' X 4' X 8' or 128 cubic feet. A standard cord may contain 60 to 100 cubic feet of solid wood depending on the size of the pieces and the compactness of the stack.

Cost Coefficients - Values which relate an acre of land to a particular dollar cost in a specific period of time.

CRM - Cultural Resource Management.

Cuesta - A sloping plain which is terminated on one side by a steep slope.

Cultural Resource - The physical remains of past human cultural systems and places or sites of importance in human history or prehistory.

Current - Refers to the year 1980, as used in this document.

Data Base - See "Resource Data Base."

DBH - Diameter at breast height (4.5 ft.).

Deferred Rotation - Discontinuance of grazing on various parts of a range in succeeding years, allowing each part to rest successively during the growing season to permit seed production, establishment of seedlings or restoration of plant vigor.

Deflection Structure - Rock, concrete, or other material structure used to change direction of streamflow.

Demand Trends - The expected future need or desire for outputs, services and uses.

Departure - A schedule which deviates from the principle of nondeclining flow by exhibiting a planned decrease in the timber sale and harvest schedule at any time in the future. A departure can be characterized as a temporary increase, usually in the beginning decade(s) of the planning period, over the base sale schedule that would otherwise be established, without impairing the future attainment of the Forest's long-term sustained-yield capacity.

Developed Recreation - Recreation that requires facilities that results in concentrated use of an area. Examples are campgrounds and ski areas. Facilities might include: Roads, parking lots, picnic tables, toilets, drinking water, ski lifts and buildings.

Directional Drilling - The art of drilling a borehole wherein the course of the hole is planned before drilling. Such holes are usually drilled with rotary equipment at an angle to the vertical, and are useful in avoiding obstacles or reaching side areas.

Dispersed Recreation - In contrast to developed recreation sites, such as campgrounds, picnic grounds, winter sports sites, resorts, and recreation residences, dispersed recreation areas are the lands and waters under Forest Service jurisdiction which are not developed for intensive recreation use. Dispersed areas include general undeveloped areas, roads, trails, and water areas not treated as developed sites.

District Key Contact List - List of influential members of the local community maintained by District Rangers.

Diversity - The relative degree of abundance of wildlife species, plant species, communities, habitats, or habitat features per unit of area.

Division #7 Water Rights Adjudication - Court delineation of all existing and pending water uses in the San Juan and Dolores river drainages. This adjudication is not yet active.

Domal Uplift - A geologic structure dome-like in shape caused by upward pressure of the earth's crust.

Dominant Species - Plants of outstanding abundance, or of such conspicuous appearance as to furnish the major aspect of the plant community for the season of observation.

Drill Seeding - Mechanical process used to plant seed in furrowed lines.

Durango Known Recoverable Coal Resource Area - KRCRA lying along the southern boundary of the San Juan National Forest from west of Pagosa Springs westward to near Mancos, containing about 222,000 acres of medium to high potential for economic coal resources, including about 75,000 acres within the San Juan National Forest.

EA - Environmental Assessment.

Ecological Position - The location of a wildlife habitat in terms of its environmental components such as latitude, altitude, precipitation, etc.

Ecosystem - The system formed by the interaction of a group of organisms and their environment.

Endangered Species - Any species which is in danger of extinction throughout all or a significant portion of its range.

Endemic - Native or confined to a certain region; having a comparatively restricted distribution.

Environmental Assessment (EA) - An analysis of all actions and their predictable short and long-term environmental effects, which include physical, biological, economic, and social factors and their interactions. Also, a concise public document required by the regulations for implementing the procedural requirements of the National Environmental Policy Act of 1969. (NOTE: The Environmental Assessment (EA) replaced the Environmental Assessment Report (EAR)).

Environmental Impact Statement (EIS) - The version of the statement of Environmental Effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review. It is a formal document which must follow the requirements of NEPA, the Council on Environmental Quality (CEQ) guidelines, and directives of the agency responsible for the project proposal.

Eolian - A term applied to deposits arranged or transported by the wind.

Erosion - The wearing away of the land's surface by running water, wind, ice, or other geological agents. It includes detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Erosion Tolerance Limits - Same as T factor; see "T, C & K Factors."

Evapotranspiration - The conversion of water, whether open or as soil moisture within plants, into water vapor that is released into the atmosphere.

Even-Aged Timber Management - The combination of actions that results in the creation of stands in which trees of essentially the same age grow together.

Even-Flow - Continuous supply of products over a given time period.

Existing Visual Condition (EVC) - The present state of visual alteration which is measured in six degrees (untouched, unnoticed, minor disturbance, disturbed, major disturbance, drastic disturbance) of deviation from the natural appearing landscape.

Extrusive - Applied to those igneous rocks derived from materials poured out or ejected at the earth's surface.

Eyrie - The nesting site of a bird of prey, as an eagle or a hawk.

Fauna - The animals of a given region or period.

Fire Management Area - One or more parcels of land with clearly defined boundaries and with established fire management direction which is responsive to land and resource management goals and objectives.

Fire Management/Effectiveness Index (FMEI) - The index value measures effectiveness of annual fire management operational programs. It is a planning, attainment, analysis, and evaluation tool for both annual and long-term programs. Measured in dollars per thousand acres protected, the objective is to minimize the index value.

Floodplain - Low land and relatively flat areas joining inland and coastal waters, including debris cones and flood prone areas of offshore islands. The minimum area included is that subject to a one percent (100-year recurrence) or greater chance of flooding in any given year.

Flora - The plants of a given region or period.

Flotation Tractor (Low PSI) - A tracked vehicle designed to have very low pounds per square inch (PSI). This type of vehicle is used in ground-skidding logs on wet or steep terrain.

Forage - All nonwoody plants (grass, grass-like plants and forbs) and portions of woody plants (browse) available to domestic livestock and wildlife for food. Only a portion of a plant is available for forage if the plant is to remain healthy.

Forage Areas - Natural or created openings or shrub areas not dense enough to hide 90 percent of a deer at a distance of 200 feet. Most forage areas can be supplied by forested areas that are not as dense as cover areas.

Forage Utilization - (1) The portion of current year's forage production by weight that is consumed or destroyed by grazing animals. Syn., degree of use. Expressed in percent of current year's growth utilized by grazing animals on an average over time based on a system of range management that will maintain the key forage species while achieving other management objectives such as the maintenance of watersheds, wildlife habitat and recreational values and the protection of regenerating plants. (2) The percent expressed in the "Prescriptions for Management Areas" is the estimated average forage utilization allowable to meet the objectives of that prescription under sustained-yield management.

Forb - Any herbaceous plant other than grass or grass-like plants.

Foreground (Visual Distance Zone) - That part of a scene, landscape, etc., which is nearest to the viewer, and in which detail is evident, usually a one-half to one-quarter mile from the viewer.

Forest Land - Land at least 16 percent stocked by forest trees of any size, or formerly having had such tree cover, and not currently developed for nonforest use.

(Forest Land) Capable - Forest land which is capable of growing industrial crops of wood at or above the minimum biological growth established by the Regional plan. This classification includes both accessible and inaccessible, stocked and non-stocked land.

(Forest Land) Capable And Available - Capable forest land which has not been legislatively withdrawn or administratively withdrawn from timber production by the Secretary or the Chief of the Forest Service. This classification includes RARE II Further Planning Areas and administrative designation below the Chief's level withdrawing land from timber production.

(Forest Land) Capable But Not Available - Capable forest land which has been legislatively withdrawn or administratively withdrawn from timber production by the Secretary or Chief of the Forest Service. Capable but not available forest land is classed as not suited for timber production.

(Forest Land) Capable-Deferred - Capable forest land which has been legislatively designated or administratively designated by the Secretary or Chief for wilderness study or possible additions to the Wilderness System. This classification includes RARE II areas designated as Wilderness, but does not include RARE II areas designated for further planning.

(Forest Land) Capable-Reserved - Capable forest land which has been legislatively withdrawn or administratively withdrawn from timber production on a permanent basis. Examples of this classification are Wilderness Areas, Primitive Areas, Research Natural Areas or special interest areas or similar formal withdrawals approved by the Chief or higher authority.

(Forest Land) Not Capable - Forest land which is not capable of growing industrial crops of wood at least at the minimum biological growth potential of 20 cubic feet per acre annually as established in the Regional plan. Forest land not capable is classed as land not suited for timber production.

Forest Plan - A process, required by Congress for assessing economic, social, and environmental impacts, which describes how land and resources will provide for multiple use and sustained yield of goods and services.

Forest-wide Management Requirements - A set of statements which define or indicate acceptable norms, specifications, or quality that must be met when accomplishing an activity or practice under a given set of conditions on the Forest.

FORPLAN - A specific linear program model designed for use in Forest Service planning.

Fourth-Order Watershed - Medium size watershed (10,000 to 25,000 acres).

Friable Topsoil - The dark-colored upper soil, that typically has favorable characteristics as a growth medium.

FSM - Forest Service Manual.

Fuel Break - A strategically located strip, normally 100 to 400 feet wide, where fuel has been reduced or modified; used as a safe location from which fire fighters can attack and control a fire.

Fuel Treatment - A rearrangement or disposal of natural or activity fuels to reduce the fire hazard. Fuels are defined as both living and dead vegetation materials consumable by fire.

Gabion - A wire mesh basket filled with rocks and used to protect erodible streambanks, or to create dams, deflectors, or other instream structures.

Gathering Pipeline - A pipeline which carries gas or liquid (natural gas, carbon dioxide, oil, etc.) from a well to a collecting facility or transmission pipeline.

Gauging Stations - Continuous streamflow measuring station usually operated by U.S. Geological Survey or Colorado Division of Water Resources.

Gene Pool Preserves - Any action that attempts to maintain the genetic equilibrium of a gene pool. Gene pool preservation requires extensive sampling of the gene pool, seed collection and continued storage (and replacement) of the seed. A nonsense term that assumes man can permanently stop natural evolutionary processes.

Growing Stock Level (GSL) - Expressed in either stems per acre or square feet of basal area of timber growing on any area.

Habitat - The place where animals live. It can be water for beaver, fish and aquatic insects; rocks for pika, bats and some species of birds, or forested areas for many mammals, birds and reptiles.

Hack Site - An artificial eyrie used to re-establish raptors into their historic range.

Hardwood - A conventional term for the timber of broad-leaved trees, and the trees themselves, belonging to the botanical group, Angiospermae.

Herbicide - A chemical compound used to kill or control growth of undesirable plant species.

Herbivore - An animal that feeds on plant substances.

Human Resource Unit (HRU) - A human-geographic area characterized by particular patterns of cultural lifestyles, economic conditions, institutional arrangements, and topography. Human resource units vary in size. They typically are larger than individual towns and communities and cross county and other political jurisdictions. The HRU is used to design, implement, and evaluate management actions that respond to changing social conditions or physical resource uses at the District or Forest level.

Hummocking - An action caused by frost or changes in soil moisture content that gives the land an appearance of having small hills or knolls.

Hydraulic Gradient - Height of a drop in stream elevation over a given section expressed in percent. Example; a stream that drops 10 feet in elevation in a 1000 foot stream section has a hydraulic gradient of 1 percent in that section.

HYSED Water Yield Sediment Model - Computer model used to evaluate the water yield and sediment yield effects of proposed land management treatments. Developed by Lee Silvey and Dave Rosgen, Region 2, U. S. Forest Service.

Igneous - Rocks formed by solidification from a molten or partially molten state.

Implementing Regulations - Regulations generated by an agency to implement Act of Congress, i.e., 36 CFR 219 contains implementing regulations for RPA and NFMA.

Indicator Species - A species whose presence in a certain location or situation at a given population level indicates a particular environmental condition. Their population changes are believed to indicate effects of management activities on a number of other species or water quality. They include at least: Endangered and threatened species identified on State and Federal lists; species with special habitat needs that may be influenced significantly by planned management programs; and animal species commonly hunted, fished, or trapped. Also called "Management Indicator Species."

Indigenous Species - Species historically native to an area; not introduced by man.

Input-Output Analysis Model (I-O) - A quantitative study of the interdependence of a group of activities based on the relationship between inputs and outputs of the activities. The basic tool of analysis is a square input-output table, interaction model, for a given period that shows simultaneously for each activity the value of inputs and outputs, as well as the value of transactions within each activity itself. It has especially been applied to the economy and the industries into which the economy can be divided.

Insecticide - An agent used to control insect populations.

Instream Flow - Usually used in defining the minimum flow necessary for all the uses of water while it is flowing through streams. Some of those uses are fisheries, channel stability, maintenance, riparian habitat maintenance and aesthetics.

Integrated Pest Management - A management strategy for suppression of forest pests which integrates silvicultural, mechanical, biological, and chemical suppression strategies which achieve greater efficiency and safety than the same strategies used alone.

Interdisciplinary Team (I.D.) - A group of individuals with skills from different resources. An interdisciplinary team is assembled because no single scientific discipline is sufficient to adequately identify and resolve issues and problems. Team member interaction provides necessary insight to all stages of the process.

Intermediate Harvest - Any removal of trees from an even-aged stand between the time of its formation and the regeneration cutting.

Intermittent Road - (Intermittent Use Road) A road developed and operated for periodic service and closed for more than one year between periods of use.

Intermittent Stream - A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow in mountainous areas.

Interpretive Sites - A developed site at which a broad range of natural or cultural history is interpreted or described for the enjoyment of the public.

Intolerant Species - Those plant species that do not grow well in shade.

Intrusive - Rocks formed from solidification of fluid flowing into or between other rocks. Solidification occurs before surface contact.

Inversion - A stable layer of air where the temperature of the air increases with height.

Isolated Finds - An archeological object or objects found in solitary circumstances.

Issue - A subject or question of widespread public discussion or interest regarding management of National Forest System Lands.

Known Recoverable Coal Resource Area (KRCRA) - An area with medium to high potential for the occurrence of coal of sufficient amount and quality to support an economic mining operation. Determination of potential is made by the U.S. Geological Survey in consultation with the coal industry, the states concerned, and the public.

Krummholz - Dwarfed trees at or near timberline.

K-V Funds - In 1930, Congress passed the Knutson-Vandenberg Act (K-V Act) to authorize collection of funds (K-V Funds) for reforestation and timber stand improvement work on areas cut over by a timber sale.

Lacustrine Nesting Habitat - Nesting areas that are associated with lakes.

Landline - Property boundary location of the San Juan National Forest.

Leasable Minerals - Coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.

Legal Administrative Status - Identifier to show specific legal or administrative requirements which may restrict management options on an area.

Linear Program Model - A mathematical method used to determine the best use of resources to achieve a desired result when limitations on available resources can be expressed in the form of equations.

Linear Programming - A mathematical technique for determining the effects of alternatives on resource allocation.

Lithics - Stone artifacts usually made through chipping or flaking techniques.

Litter - The uppermost layer of organic debris on the ground under a vegetation cover, i.e., essentially the freshly fallen or only slightly decomposed vegetable material, mainly from foliage but also bark fragments, twigs, flowers, fruits, etc.

Local Roads - Roads that connect terminal facilities with collector roads, arterial roads, or public highways. May be developed for either long-term or short-term service.

Locatable Minerals - Those hardrock minerals which are mined and processed for the recovery of metals. May include certain nonmetallic minerals and uncommon varieties of mineral materials such as valuable and distinctive deposits of limestone or silica. May include any solid natural inorganic substance occurring in the crust of the earth, except for the common varieties of mineral materials and leasable minerals.

Long-Term - Action governed by the Forest Plan generally taking place over a period longer than ten years from the present.

M - 1,000 Units.

Management Area - An area that has common direction throughout that differs from neighboring areas. The entire Forest is divided into management areas. Each is described, and policies and prescriptions relating to their use are listed.

Management Concern - A matter of importance to the management of the National Forest System Lands, which is identified internally by the agency.

Management Direction - A statement of multiple use and other goals and objectives, the management prescriptions, and the associated standards and guidelines for governing them.

Management Indicator Species - See Indicator Species.

Management Opportunity - A statement of general actions, measures or treatments that address the public issue or management concern in a favorable way.

Management Practice - A specific action, measure or treatment.

Management Prescription - Management practices selected and scheduled for application in a specific area to attain multiple use and other goals and objectives.

Management Team - Decision-making group consisting of the Forest Supervisor, Program Officers, and District Rangers.

Marginal Analysis - A type of analysis in which the only costs and benefits considered are those about which decisions can be made. Fixed benefits and costs are not considered.

Mass Movement - Downslope unit movement of a portion of the land's surface, i.e., a single landslide or the gradual simultaneous downhill movement of a whole mass of loose earth material on a slope face.

Maximum Modification (VQO) - A visual quality objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

MBF - One thousand board feet of timber.

Mesa - A tableland; a flat topped mountain or other elevation bounded on at least one side by a steep cliff.

Middleground (Visual Distance Zone) - That part of a scene or landscape which extends from the foreground zone to 3 to 5 miles from the observer. Texture is discernible at this distance.

Migration Routes - Routes followed by an animal species during periods of annual movement usually between summer and winter ranges.

MIH Codes - Management Information Handbook codes.

Mineral Entry - The right under the Mining Law of 1872 to enter non-withdrawn public domain land, such as National Forests, and to explore for, extract, and sell certain locatable minerals; protected by the filing of a lode, placer, or mill site claim.

Minimum Level Management - The management strategy that would meet only the basic statutory requirements of administering unavoidable, non-discretionary land uses, preventing damage to adjoining lands of other ownerships, and protecting the life, health, and safety of incidental users.

MM - 1,000,000 Units.

MMBF - One million board feet of timber.

Modification (VQO) - A visual quality objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

Montane - A climatic or vegetative zone characterized by the dominance of evergreen trees on cool upland slopes below timberline.

Multiple Use - The management of all various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

National Register of Historic Places - A listing maintained by the National Park Service of areas which have been designated as being of historical significance.

NEPA - National Environmental Policy Act.

NFMA - National Forest Management Act.

No Action Alternative - The most likely condition expected to exist in the future if current management direction would continue unchanged.

Non-commercial Forest Land - See "(Forest Land) Not Capable."

Non-declining Yield - A level of timber production planned so that the planned sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade.

Non-forest Land - Land that has never supported forests and lands formerly forested where use for timber utilization is precluded by development for other use. Includes areas used for crops, improved pasture, residential areas, improved roads of any width and adjoining clearings, and powerline clearing of any width. If intermingled in forest areas, unimproved roads and non-forest strips must be more than 120 feet wide, and clearing more than one acre in size to qualify as non-forest land. The non-forest land is classified as land not suited for timber production.

Non-game Species - Animal species that are not usually hunted in Colorado. This classification is determined by the State Legislature.

Non-structural Range Improvement - A modification of existing vegetation to improve the grazing resource. Examples are spraying or plowing sagebrush and seeding to grass.

Noxious Weed - A noxious, destructive, or troublesome plant when found to be in epidemic proportions and of economic importance to threaten the public welfare.

Objective - A clear and specific statement of planned results to be achieved within a stated time period. The results indicated in the statement of objectives are those which are designed to achieve the desired condition represented by the goal. An objective is measurable and implies precise time-phased steps to be taken and resources to be used which, together, represent the basis for defining and controlling the work to be done.

Obliteration - The returning of the land occupied by a road or trail to production.

Occupancy Trespass - The illegal occupation or possession of National Forest land.

Opportunity Costs - The value of the benefits foregone or given up due to the effect of choosing another management alternative that either impacts existing outputs or shifts resources away from other activities so that they are no longer produced and their benefits are lost.

ORV - Off-road vehicles; this includes all mechanical means of transportation; passenger cars, four-wheel-drive vehicles, trail bikes, and snowmobiles that are capable of traveling over land where no road exists.

Output Coefficient - Values which relate an acre of land to a particular quantity of output in a specific period of time.

Overstory - Relative to even-aged stands; the mature trees which overtop the younger trees.

PAOT - See "Persons-At-One-Time."

Partial Retention (VQO) - A visual quality objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.

Patented Mining Claim - A mining claim to which the Federal Government has granted the claimant all surface and some or all mineral rights. Patented mining claims are private land and may be sold or used for other than mining activity, such as residential or recreational use.

Perennial Stream - Streams that flow throughout the year and from source to mouth.

Persons-At-One-Time - A recreation-capacity measurement term indicating the number of people that can comfortably occupy or use a facility or area at one time.

Physiographic Province - Region of similar structure and climate that has had a unified landform history.

Placer Activity - Mining activity in which the surface rock debris is washed for gold or other valuable minerals.

Planning Criteria - Criteria prepared to guide the planning process and management direction.

Planning Question - A major policy question of long-range significance, derived from the public issues and management concerns, to be decided when selecting among Forest Plan Alternatives.

Plantation - A forest crop or stand raised artificially, either by seeding or planting of young trees.

Pole Timber - As used in timber survey, a size class definition, trees 5.0 to 8.9 inches at DBH. As used in logging operations, trees from which pole products are produced, such as telephone poles, pilings, etc.

Post Market - The market of trees to be used as fence posts. They are normally four inches to ten inches in diameter and six to ten feet long.

Pothunting - Slang term used by professional archaeologists to describe illegal or non-professional collecting of relics.

Predator - An animal species that obtains its food by hunting other animal species.

Preparatory Cut - See "Shelterwood Cut."

Prescribed Fire - Fire burning under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation, stimulate growth of desired vegetation, change successional stages, etc., to meet range, wildlife, recreation, wilderness, watershed, or timber management objectives.

Prescription - See "Management Prescription."

Present Net Value - Discounted benefits less discounted costs associated with providing all outputs to which monetary values can be assigned.

Preservation (VQO) - A visual quality objective that provides for ecological change only.

Primitive Management Area - A wilderness management area characterized by high levels of solitude in an essentially unmodified natural ecosystem, with a low level of trail access.

Primitive Road - A two-track road that has evolved primarily through use by off-road high clearance vehicles; usually no planning, design, or construction has occurred and the road snakes its way between obstacles to reach the user's destination.

Primitive ROS Class - A classification of the recreation opportunity spectrum characterized by an essentially unmodified environment, where trails may be present but structures are rare, and where probability of isolation from the sights and sounds of man is extremely high.

Pristine Management Area - A wilderness management area characterized by highest levels of solitude. High emphasis on opportunities for challenge, risk, and self-reliance, with no trail access.

Productive Deferred - See "(Forest Land) Capable-Deferred."

Productive Reserved - See "(Forest Land) Capable-Reserved."

Protection Element (Fire) - A support element providing protection to Forest resources and users; such as fire suppression.

Public Issue - A subject or question of widespread public discussion or interest regarding management of National Forest System Lands and identified through public participation.

Range Allotment - An area designated for the use of a prescribed number of cattle or sheep, or by common use of both, under one plan of management.

Raptor - A predatory bird.

Reclamation - Returning disturbed lands to a form and productivity that will be ecologically balanced and in conformity with a predetermined land-management plan.

Record of Decision - The documentation of what the decision was, the date, and a statement of reasons for the decision.

Recreation Opportunity Spectrum - A land classification system which categorizes National Forest land into six classes, each class being defined by its setting and by the probable recreation experiences and activities it affords. The six classes in the spectrum are primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, rural, and urban.

Recreation Residence Site - House or cabin permitted on National Forest land for the recreational use of the owner, but not as a primary residence.

Recreation Visitor Day (RVD) - Recreational use of National Forest land which aggregates twelve hours. It may consist of one person for twelve hours, two people for six hours, or any combination that totals twelve hours.

Recreational River - Wild and Scenic Rivers Act Usage. Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Reforestation - The natural or artificial restocking of an area with forest trees.

Reforestation Backlog - Areas that need to have trees reestablished. This can be done by planting, seeding, or preparing the site for natural regeneration.

Regeneration - (1) The actual seedlings and saplings existing in a stand. (2) The act of establishing young trees naturally or artificially.

Regeneration Cut - Removal of trees with the intention of establishing a new crop of seedlings.

Regional Acceptable Work Standards - A set of standards which define or describe the way an activity is conducted whenever and wherever that activity is performed. The standards for the performance of specific activities are defined in the Management Information Handbook (FSH 1309.11). When an activity is performed, it will be performed within the limits established by the standard.

Regulated - Forest land managed for timber production under sustained yield principles.

Remote Sensing - The acquisition of information from a distance, generally by carriers that involve electromagnetic energy and sometimes by gravity and sound.

Removal Cut - See "Shelterwood Cut."

Research Natural Area - Land areas classified by order of the Chief of the U. S. Forest Service containing natural plant communities that have not been modified by man, and are protected and studied to obtain more information about the ecosystem.

Resource Data Base - Information about resources stored in a computerized system.

Rest-Rotation - A grazing system in which the pastures being rotated receive nonuse for a period of plant recovery.

Retention (VQO) - A visual quality objective which in general, means man's activities are not evident to the casual forest visitor.

Revegetation - The reestablishment and development of a plant cover. This may take place naturally through the reproductive processes of the existing flora or artificially through the direct action of man.

Riffle Section - Stream section of fast gradient and shallow water depth that creates turbulent water surface as opposed to pools.

Right of Eminent Domain - The taking of property for a necessary public use, with reasonable compensation being made to the property owner.

Rill Erosion - The removal of soil by the cutting of numerous small, but conspicuous water channels or tiny rivulets by concentrated surface runoff.

Riparian - Referring to land adjacent to perennial streams, lakes, and reservoirs and including other well developed riparian vegetation (primarily intermittent streams). This land is specifically delineated by the transition between the aquatic ecosystem and the adjacent terrestrial ecosystem and defined by soil characteristics and distinctive vegetation communities that require free and unbound water.

Riprap - Materials such as rocks, logs, and concrete which are placed along a water course to stabilize the banks.

Road Density - The measure of the degree to which the length of road miles occupies a given land area, i.e., 1 mi/sq. mi. is one mile of road within a given square mile.

Road Prism - The geometric features of a road structure including all the disturbed area within a given portion of road. These features include the cut bank, ditch, travel surface, and the fill slope.

Roaded Natural ROS Class - A classification of the Recreation Opportunity Spectrum that characterizes a predominantly natural environment with evidence of moderate permanent alternate resources and resource utilization. Evidence of the sights and sounds of man is moderate, but in harmony with the natural environment. Opportunities exist for both social interaction and moderate isolation from sights and sounds of man.

Rodenticide - An agent that kills, repels or controls rodents.

Roller Chopping - Crushing of undesirable vegetation with a large cylinder to encourage more desirable vegetation.

Root Plowing - The shearing of roots underneath the soil by a machine pulled by a large tractor or bulldozer, usually done in oak in the Region.

ROS Class - See "Recreation Opportunity Spectrum."

Rotation - The planned number of years between the start of a crop of trees and their final harvest. The rotation age will vary according to geographic location, tree species, and management objectives.

Roundwood - Trees that are used without being milled (fence posts, telephone poles, pulpwood, etc.).

RPA - Forest and Rangeland Renewable Resource Planning Act of 1974.

RPA National Assessment - A document compiled by the Secretary of Agriculture every 10 years which contains facts and analyses to develop and guide public and private forest and range land policies and programs.

RPA National Program - A document compiled by the Secretary of Agriculture every five years which outlines Forest Service programs for National Forest System management, cooperative assistance to States and private landowners, and research.

Rural ROS Class - A classification of the Recreation Opportunity Spectrum that characterizes an area in which the sights and sounds of man are prevalent and the landscape has been considerably altered by the works of man.

RVD - See "Recreation Visitor Day."

Salable Minerals - Deposits which, although they may have value for use in trade, manufacture, the sciences, or in the mechanical or ornamental arts, do not possess a distinct, special economic value for such use over and above the normal uses of the general sum of such deposits. May include sand, stone, gravel, pumicite, cinders, pumice (except that occurring in pieces over two inches on a side), clay, and petrified wood.

Salvage - Dead or dying trees which occur in excess of those needed for wildlife, aesthetics, or other purposes. These trees are harvested for products.

Sapling - As used in timber survey, a size class definition; trees 1.0 to 4.9 inches at DBH.

Satellite Imagery - A pictorial representation obtained from a satellite.

Satisfactory Range Condition - Rangeland in range condition class of at least fair with stable or upward trend.

Sawtimber - As used in timber survey, a size class definition; trees larger than 9 inches at DBH.

Scarification - Loosening the topsoil in open areas to prepare for regeneration by direct seeding or natural seedfall.

Scenic Easement - Relative to the Wild and Scenic Rivers Act (P.L. 93-621) 1975, and by definition of the act; the right to control the use of land (including the air space above such land) within the authorized boundaries of a component of the Wild and Scenic Rivers System, for the purpose of protecting the natural qualities of a designated wild, scenic or recreational river area, but such control shall not affect, without the owner's consent, any regular use exercised prior to the acquisition of the easement.

Scenic River - Wild and Scenic Rivers Act usage. Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

Scouring - The act of erosion, especially by moving water.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sediment Yield - Amount of solid waste washed into a water course.

Sedimentary Rocks - Rocks formed by the accumulation and settling of suspended solid materials in water or from air. A characteristic feature of these rocks is a layered structure.

Seed Cut - See "Shelterwood Cut."

Seedbed - In natural regeneration, the soil of forest floor on which seed falls. In nursery practice, a prepared area which is seeded.

Seedling - As used in timber survey, a size class definition; trees less than one inch at DBH.

Selection Harvest Cut - A system which removes trees individually in a scattered pattern from a large area each year. (1) Individual tree selection cutting involves the removal of selected trees of all size classes on an individual basis. Regeneration is established under the partial shade of the overstory canopy after each cut. (2) Group selection cutting involves the removal of selected trees of all size classes in groups of a fraction of an acre up to 2 to 3 acres in size. Regeneration occurs in the groups under conditions similar to those found in small clearcuts.

Semi-Primitive Management Area - A wilderness management area characterized by moderate opportunity for solitude in a predominantly unmodified natural environment, with a moderate degree of trail maintenance.

Semi-Primitive Motorized ROS Class - A classification of the Recreation Opportunity Spectrum characterized by moderately dominant alterations by man, with strong evidence of primitive roads and/or trails.

Semi-Primitive Non-motorized ROS Class - A classification of the Recreation Opportunity Spectrum characterized by few and/or subtle modifications by man, and with a high probability of isolation from the sights and sounds of man.

Sensitive Areas - Areas of high erosion hazard, areas that may be susceptible to compaction, or areas of unstable slopes.

Sensitivity Level - As used in Cultural Resource Management; the degree of cultural resource development potential and/or the degree of conflict with other uses for a given area.

Sensitivity Level - As used in Visual Quality Management; a particular degree or measure of viewer interest in the scenic qualities of the landscape.

Sensitivity/Predictive Model - A tool developed on the San Juan National Forest to indicate cultural resource potentials of primarily uninventoried lands.

Sheet Erosion - The removal of a fairly uniform layer of soil from the land surface by runoff water, without the development of conspicuous water channels.

Shelterwood Cut - An even-age regeneration system where the mature trees are removed in two or more cuts. (1) The preparatory cut removes a portion of the mature trees and is intended to make the remaining trees more wind firm; preparatory cuts may be omitted where windfall is not a major concern. (2) The seed cut removes additional trees with the intent of allowing additional sunlight to reach the forest floor. The new trees become established following the seed cut. (3) The removal cut removes the last of the mature trees.

Silviculture - A combination of actions whereby forests are tended, harvested, and replaced.

Site Preparation - Preparation of the ground surface before planting or preparing a seedbed for natural regeneration; includes removal of unwanted vegetation, slash, stumps and roots from a site.

Skid Trail - Travelway used to drag or transport trees from the stump to the road.

Skidding Pan - A plate of heavy steel that supports the log being skidded to prevent it from digging into the ground.

Slash - Debris left after logging, pruning, thinning or brush cutting, and large accumulation of debris after wind or fire. It includes logs, branches, bark, and stumps.

Snag - A standing dead tree, used by birds for nesting, roosting, perching, courting, and/or foraging for food. There are many mammals that use snags for denning and foraging for food.

"Snag" Policy - See "Wildlife Tree Policy."

Social Resource Unit (SRU) - A human-geographic area exhibiting common cultural, economic, and institutional characteristics. An SRU is an aggregation of human resource units (HRU) and typically crosses National Forest, County, and State boundaries. The SRU is used to design, implement, and evaluate management actions that respond to changing social conditions or physical resource uses at an area or Regional level.

Softwood - A conventional term for both the timber and the trees belonging to the botanical group, Gymnospermae.

Soil Profile - A progression of distinct layers of soil, beginning at the surface that has been altered by normal soil-forming processes such as leaching, oxidation, and accretion.

Spatial Feasibility - The capacity of a land allocation to be practically implemented on the ground.

Stage II Survey - An intensive inventory designed to gather and measure timber data specific to individual stands.

Structural Diversity - Variety in a forest stand that results from layering or tiering of the canopy; and increase in layering leads to an increase in structural diversity.

Structural Range Improvement - Any type of range improvement that is man-made (fences, corrals, etc.).

Subsoil - The layer below the soil surface in which roots normally grow.

Succession - An orderly process of biotic community development that involves changes in species, structure and community processes with time; it is reasonably directional and, therefore, predictable.

Suitable Range - Range which is accessible to livestock or wildlife, and which can be grazed on a sustained yield basis without damage to other resources.

Suitable Timber Lands - Forest lands to be managed for timber production.

Sustained Yield - The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest without impairment of the productivity of the land.

T, C & K Factors - (T-Factor) - This is the tolerable loss factor. It is the amount of erosion that a specific soil can withstand and still maintain long-term productivity. The values have been determined for selected soil characteristics for agricultural situations and range from 1-5 tons per acre per year depending on the soil characteristics. (C-Factor)- This is the cover coefficient or vegetative management factor used in the universal soil loss equation (USLE). It is the ratio of soil loss from disturbed forest areas to that from a fallow condition of comparable soil. (K- Factor)- This is the soil erodibility factor used in the universal soil loss equation. It is a measure of the susceptibility of soil particles for detachment and transport by rainfall and runoff.

Thinning - Cutting made in an immature crop or stand, primarily to accelerate the diameter increment (annual growth) of the residual trees, but also by suitable selection, to improve the average form of the trees that remain.

Threatened Species - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Threshold Limits - The amount of sediment (tons/year) which can occur in a drainage before unacceptable sediment concentrations and amounts, or channel stability problems occur.

Tiering - Incorporating information contained in an EIS (Environmental Impact Statement), such as the Forest Plan EIS, by reference in subsequent environmental documents.

Timber Stand Improvement (TSI) - Usually related to activities conducted in young stands of timber to improve growth rate and form of the remaining trees. Examples are: thinning, pruning, fertilization, and control of undesirable vegetation.

Tolerable Limits - For soils, see "T, C & K Factors." Refers to T- Factor.

Topsoil - The original or present dark-colored upper soil that ranges from a mere fraction of an inch to two or three feet deep.

Transition Management Area - A wilderness management area characterized by limited opportunity for solitude in a generally unmodified natural environment; normally areas have many party encounters, low opportunities for challenge and a high level of on-site public safety.

Transmission Pipeline - A pipeline which carries gas or liquid from a producing field or central collection facility to a storage or consumption facility, usually over long distances.

TSI - See "Timber Stand Improvement."

Unconstrained Maximum - Level of management defined as the highest possible level of a given output along with the costs associated with achieving it.

Uneven-aged Timber Management - The combination of actions that result in the creation of forests in which trees of several or many ages grow together; achieved through selection harvest.

Universal Soil Loss Equation (USLE) - An empirical erosion model, originally designed for agricultural situations that computes long-term average soil losses from sheet and rill erosion under specific conditions. Recent research has provided methods so that USLE can also be used to estimate sheet and rill erosion for Forest Management activities.

Unpatented Mining Claim - A claim made by a qualified person for possession of locatable minerals on public domain land (e.g., National Forests); a properly recorded claim entitles the claimant to reasonable access to the claim and exclusive right to extract and sell valuable minerals from the claim. Unpatented mining claims may be occupied and used solely for mining and related activity.

Unregulated - (Pre-1980 Terminology) Forest land that is suitable and available, but not organized for timber production under sustained yield principles; where timber harvest is permissible but not a goal of management.

Unsatisfactory Range Condition - Rangeland in range condition of poor or very poor and of fair in a downward trend.

Urban ROS Class - A classification of the Recreation Opportunity Spectrum in which the natural setting is dominated by man-made structures and the sights and sounds of man predominate.

Utility Corridor - A tract of land of varying width forming a passageway through which various commodities such as oil, gas, and electricity are transported.

Utilization of Forage - See "Forage Utilization."

Variety Class - A particular level of diversity of landscape character.

Vegetative Manipulation - The change of one vegetation type to another. It can be done by a tractor, chemicals, or fire. Usually, this is done to increase forage for livestock and can be a beneficial tool for wildlife.

Vertical Diversity - The diversity in an area that results from the complexity of the above ground structure of the vegetation; the more tiers of vegetation or the more diverse the species make-up, or both, the higher the degree of vertical diversity.

VIS (Visitor Information Services) - A service provided to the public by National Forests in which the public is supplied with information regarding opportunities or activities on National Forest land; usually but not restricted to recreational opportunities.

Visual Absorption Capacity (VAC) - Indicates the relative difficulty or cost of achieving VQO's. It measures the land's capacity to absorb the visual impacts of management activities.

Visual Distance Zones - Areas of landscapes denoted by specified distances from the observer. Used as a frame of reference, in which to discuss landscape characteristics or activities of man. The three zones are Foreground, Middleground, and Background.

Visual Management Program - Also referred to as "Landscape Management" or "Visual Resource Management"; the art and science of planning and administering the use of forest lands in such ways that the visual effects maintain or upgrade man's psychological welfare. It is the planning and design of the visual aspects of multiple-use land management.

Visual Quality Objective (VQO) - A desired level of excellence based on physical and sociological characteristics of an area. Refers to degree of acceptable alteration of the characteristic landscape. The five levels are Preservation, Retention, Partial Retention, Modification, and Maximum Modification.

Water - Streams, sloughs, estuaries, and canals 120 feet or more in width; and lakes, reservoirs, and ponds more than one acre in area.

Water Yield - The total net amount of water produced on the Forest including streamflow and groundwater recharge.

Watershed - The entire area that contributes water to a drainage or stream.

Wetlands - Areas with shallow standing water or seasonal to year-long saturated soils (includes bogs, marshes, and wet meadows).

Wheeled Skidders - An internal combustion wheeled vehicle specifically designed to skid logs.

Wild and Scenic River Corridor - See "Wild River" and "Scenic River."

Wild River - Wild and Scenic Rivers Act usage. Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted.

Wildcat Drilling - To drill and develop unproven ground far from previous production, generally of a risky nature.

Wilderness - The National Wilderness Preservation Act of 1964 defines a wilderness as an area of undeveloped, Federally owned land designated by Congress that has the following characteristics: (1) It is affected primarily by the forces of nature, where man is a visitor who does not remain. It may contain ecological, geological, or other features of scientific, educational, scenic, or historical value. (2) It possesses outstanding opportunities for solitude or a primitive and unconfined type of recreation. (3) It is an area large enough so that continued use will not change its unspoiled natural condition.

Wilderness Recreation Opportunity Management Areas - Delineated areas in wildernesses which have different use characteristics and degrees of trail development. The four management areas are Transition, Semi-primitive, Primitive, and Pristine.

Wilderness Study Area (WSA) - One of the areas selected by Congress from an inventory of unroaded and undeveloped National Forest lands as having apparent high qualities for wilderness. They will be studied to determine whether they should be recommended for addition to the National Wilderness Preservation System.

Wildfire - Any wildland fire that requires a suppression action. This includes all fires not meeting the requirements of a prescribed fire.

Wildlife Habitat - The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

Wildlife Structure - A site specific improvement of a wildlife or fish habitat, i.e., spring development or dugout to provide water, brushpile for cover, nestbox for birds, or rock and log placement in a stream for fish cover and pool creation.

Wildlife Tree Policy - A policy that encourages the preservation of snags for wildlife use; optimum numbers are 20-30 snags per 10 acres.

Winter Range - The area occupied by an animal species during the winter.

Withdrawal - Withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program.

YUM Yarding - The skidding of unmerchantable material to a landing or collection point.

APPENDIX B

REFERENCES CITED AND EXISTING PLANS, STUDIES, REPORTS AND INVENTORIES

REFERENCES CITED AND EXISTING PLANS, STUDIES, REPORTS AND INVENTORIES

Copies of specific Forest Service Manuals, Forest Service Handbooks, and Congressional Acts and Laws referenced in this Plan, are on file in the library of the Forest Supervisor, San Juan National Forest, Durango, Colorado.

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APPENDIX C

PLANNING QUESTION SHEETS

PLANNING QUESTION I

How Should the San Juan National Forest be Managed to Provide a Broad Spectrum of Dispersed Recreation Opportunities?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P1. We want more dispersed recreation opportunities and facilities on the National Forest. (See Opportunities 1, 4, and 5.)	1. Expand public information and environmental education (I&E) programs offered to Forest users, interest groups, and schools. (Addresses P 1, 2, 5, 32, 33, 36, 39, 79 and C 1, 2, 3, 4, 5, and 36.)	All prescriptions
P2. Some areas on the National Forest are being overused. (See Opportunities 1, 2, 3, and 6.)	2. Rehabilitate existing resource damage in use areas. (Addresses P 2, 33, and 79.)	Forest-wide Management Requirements - Soils
P4. Keep some roadless areas to enjoy without vehicles. (See Opportunities 3, 4, 6, 10.)	3. Manage use of sensitive areas by people, livestock and vehicles. (Addresses P 2, 4, 32, 33, 34, 79, and C 1, 3, 5, 16, and 36.)	Forest-wide Management Requirements - Soils; all prescriptions protect sensitive areas
P5. The Forest Service is not geared to manage dispersed recreation, so why encourage it? (See Opportunities 1 and 6.)	4. Provide a wide spectrum of all season dispersed recreation use and facilities. (Addresses P 1, 4, 35, 36, 40, 71 and C 3, 4, and 13.)	All prescriptions; best in F_1, F_2, G_1, G_2, H, J
P32. Restrict the use of ORV's in the National Forest. (See Opportunities 1, 3, 6, 10.)	5. Provide suitable areas for ORV use. (Addresses P 1, 35, 36, 40 and C 4 and 16.)	A_1, A_2, B, C, D, F_1, F_2, G_1, G_2, R
P33. ORV's are destructive and offensive. (See Opportunities 1, 2, 3, and 6.)	6. Restrict ORV use. (Addresses P 2, 4, 5, 32, 33, 34, 39 and C 5, 6, and 36.)	H prohibits ORV's; all others restrict in varying degrees
P34. Ban the use of ORV's in the National Forest. (See Opportunities 3 and 6.)	7. Alert recreationists to where livestock concentrate. (Addresses P 79 and C 5.)	A_1, A_2, B, D, F_1, F_2
P35. Keep the National Forest open for ORV use and don't close the roads to motorized use. (See Opportunities 4 and 5.)	8. Emphasize dispersed non-motorized recreation opportunities in areas not classified as wilderness. (Addresses C 2.)	H
P36. We want to be able to go where we want via trails and roads on the National Forest in an efficient and safe manner. (See Opportunities 1, 4, 5, and 9.)	9. Increase mobility and efficiency throughout the transportation system. (Addresses P 36 and 40.)	All prescriptions (best in prescriptions emphasizing commodity production B through F_2)
P39. De-emphasize driving for pleasure. (See Opportunities 1, 6, and 10.)	10. De-emphasize dispersed motorized recreation. (Addresses P 4, 32, and 39.)	Prohibited in H; de-emphasized in A_1, A_2 E, R
P40. Put more emphasis on driving for pleasure. (See Opportunities 4, 5, and 9.)	11. Improve livestock distribution and use. (Addresses P 79 and C 5.)	All prescriptions allowing grazing; best in A_1, A_2 B
P71. I would like to see more trout fishing. (See Opportunity 4.)	12. Reduce livestock numbers and/or seasons. (Addresses P 79 and C 5.)	E, F_1, F_2, M
P79. Sheep, cattle, and horses are interfering with recreation experiences and damaging resources. (See Opportunities 1, 2, 3, 7, 11, 12, and 13.)	13. Restrict human use to minimize conflicts with grazing use. (Addresses P 79 and C 5.)	A_1, A_2, B, D

How Should the San Juan National Forest be Managed to Provide a Broad Spectrum of Dispersed Recreation Opportunities?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C1. Resource damage, overcrowding and parking problems are resulting in some locations leading to dispersed recreational areas. (See Opportunities 1 and 3.)	14. Restrict human use in specified wildlife areas. (Addresses C 36.)	Best in E, F_1, F_2; also A_1, A_2, B, D
C2. Dispersed recreation opportunities within classified wilderness areas are over-emphasized both internally and externally. (See Opportunities 1 and 8.)		
C3. Recreation use is concentrated in the popular areas, while many other areas are relatively unused. (See Opportunities 1, 3, and 4.)		
C4. We are not accommodating the increasing demand for cross-country skiing, snowmobiling, and ORV use. (See Opportunities 1, 4, and 5.)		
C5. Specific conflicts exist between the recreating public and domestic livestock grazing on the cattle allotments. (See Opportunities 1, 3, 6, 7, 11, 12, and 13.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunity 4.)		
C16. The uncontrolled and increasing level of ORV use is and will continue to result in unacceptable erosion. (See Opportunities 3 5, and 6.)		
C36. Dispersal of people conflicts with wildlife, i.e., solitude, calving areas, migration routes, etc. (See Opportunities 1, 3, 6, and 14.)		

PLANNING QUESTION II

What is the Appropriate Role of the San Juan National Forest in Providing Campgrounds, Interpretive Sites, Picnic Areas, and Rest Stops?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P10. We need additional roadside picnic areas, rest stops, and campgrounds, especially along major highways. (See Opportunities 1 and 3.)	1. Provide additional sites for concentrated use, in response to need. (Addresses P 10 and C 8 and 9.)	Q
P12. There are already enough campgrounds and rest areas. (See Opportunities 2 and 4.)	2. Do not develop additional sites for concentrated use. (Addresses P 12 and 13, and C 6 and 7.)	A_1, A_2, C, D, E, G_1, G_2, H
P13. National Forest campgrounds are in direct competition with private campground operations. (See Opportunities 2, 3, and 4.)	3. Develop concession permit or co-op areas. (Addresses P 10 and 13, and C 6, 7, and 8.)	Q
P14. There should be some camping areas open to tenters only. (See Opportunity 4.)	4. Modify existing sites to better meet needs. (Addresses P 12, 13, and 14 and C 6 and 10.)	L_2, Q
C6. We may be providing competition and duplicating the efforts of developed facilities provided in the private sector. (See Opportunities 2, 3, and 4.)	5. Coordinate any recreational development in the Chimney Rock vicinity with the economic goals and site development plans of the Southern Ute Tribe, particularly around Capote Lake. (Addresses C 7.)	L_1, L_2
C7. Further Forest Service recreational development in the Capote Lake vicinity could adversely affect the economic goals of the Southern Ute Tribe. (See Opportunities 2, 3, and 5.)		
C8. There are too few scenic turnouts on major highways. (See Opportunities 1 and 3.)		
C9. Our existing facilities for providing recreation opportunity are not located, designed, or are types that are not sensitive to the need for energy conservation. (See Opportunity 1.)		
C10. Some existing developed recreation sites are not adequately located or the correct type (i.e., day use, overnight use, etc.) to meet the needs of the public. (See Opportunity 4.)		

What Resources and Uses Should be Allocated to Downhill Skiing on the San Juan National Forest?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P17. Lift lines at ski areas are too long. Do not preclude development of potential sites. (See Opportunity 1.)	1. Allow increased capacity for skiing. (Addresses P 17, 19, and 59.)	I
P19. Stimulate and manage winter recreation, including a ski area. (See Opportunity 1.)		
P20. Expansion of downhill skiing is not needed. (See Opportunity 2.)	2. Do not allow for increased capacity for skiing. (Addresses P 20 and C 11.)	All except I
P59. Use the National Forest to improve local economy. (See Opportunity 1.)		
C11. Further development of downhill skiing to meet increasing demand could have adverse effects on community stability and availability of other resources. (See Opportunity 2.)		

PLANNING QUESTION IV

How Much Designated Wilderness Should the San Juan National Forest Have, and How Should it be Managed?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P21. There are too many people in some areas of the wilderness, noisy helicopters flying around, and hiker-horse conflicts that need correcting. (See Opportunities 1, 2, 5, and 6.)	1. Increase restrictions on numbers and distribution of people and recreational stock. (Addresses P 21 and 26, and C 3, 12, and 13.)	8_e through 8_h
P22. Restrictions on numbers of people are unnecessary and unwise at this time in the Weminuche Wilderness. (See Opportunities 6 and 7.)	2. Limit use of helicopters. (Addresses P 21 and C 12.)	8_a through 8_h
P23. Do not lock up our resources in wilderness. Maintain multiple use management. (See Opportunity 9.)	3. Manage livestock in a manner compatible with wilderness values. (Addresses P 26, 27, and 28 and C 12.)	8_a through 8_h
P24. Provide more wilderness. (See Opportunity 8.)	4. Maintain facilities for resource protection. (Addresses P 26 and C 12 and 13.)	8_a through 8_d
P26. Prevent resource damage in the wilderness. (See Opportunities 1, 3, 4, and 6.)	5. Emphasize dispersed non-motorized recreation opportunities in areas not designated as wilderness. (Addresses P 21 and C 2, 3, and 12.)	H
P27. Allow us to graze our livestock in the wilderness. (See Opportunity 3.)	6. Expand public information and environmental education (I&E) programs offered to Forest users, interest groups, and schools. (Addresses P 21, 22, and 26 and C 2, 3, and 12.)	8_a through 8_h
P28. Restrict grazing of livestock in the wilderness. (See Opportunity 3.)	7. Do not restrict numbers, but educate users as to expected conditions. (Addresses P 22.)	8_a through 8_d
C2. Dispersed recreation opportunities within designated wilderness areas are overemphasized both internally and externally. (See Opportunities 5 and 6.)	8. Recommend to Congress that Wilderness Study Areas be designated wilderness. (Addresses P 24.)	8_a through 8_h
C3. Recreation use is concentrated in the popular areas, while many other areas are relatively unused. (See Opportunities 1, 5, and 6.)	9. Recommend to Congress that Wilderness Study Areas not be designated wilderness. (Addresses P 23.)	All except 8_a through 8_h
C12. Depreciation of wilderness resource values is, or may be, occurring through too many people, helicopter use for mining, trail signing and maintenance, overgrazing, water pollution, presence of livestock, horse-hiker conflicts, and structures. (See Opportunities 1, 2, 3, 4, 5, and 6.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunities 1 and 4.)		

What Kind of Transportation System is Necessary to Serve Future Resource Management and Public Needs?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P4. Keep some roadless areas to enjoy without vehicles. (See Opportunities 3, 5, 8, and 13.)	1. Increase mobility and efficiency throughout the transportation system. (Addresses P 35, 36, 40, and 102 and C 13, 14, 17, 18, and 19.)	All prescriptions (best in prescriptions emphasizing commodity production B through F_2)
P8. The scenery isn't as nice anymore because of timber sales, utility lines, road corridors, and other things. (See Opportunities 5, 8 and 9.)	2. Provide increased access to Forest lands. (Addresses P 35, 36, 40, and 102 and C 13, 17, 18, 19, and 53.)	B through G_2, I, J
P32. Restrict the use of ORV's in the National Forest. (See Opportunities 3, 5, and 13.)	3. Minimize vehicle access to Forest lands. (Addresses P 4, 32, 37, 38, 39, and 103 and C 16.)	H
P35. Keep the National Forest open for ORV use and don't close roads to motorized use. (See Opportunities 1, 2, 4, and 7.)	4. Provide for more dispersed recreation opportunities. (Addresses P 35 and 36 and C 1, 17, 18, and 19.)	All prescriptions; best in F_1, F_2, G_1, G_2, H, J, R
P36. We want to be able to go where we want via trails and roads on the National Forest in an efficient and safe manner. (See Opportunities 1, 2, 4, and 7.)	5. De-emphasize dispersed motorized recreation. (Addresses P 4, 8, 32, 37, 38, 39, and 42 and C 16.)	Prohibited in H; de-emphasized in A_1, A_2, E
P37. Don't build any more roads. (See Opportunities 3, 5, and 8.)	6. Construct and maintain roads/trails consistent with use and needs. (Addresses C 13, 14, 15, 17, 18, and 19.)	Forest-wide Management Requirements - Transportation
P38. Close and restore timber access roads. (See Opportunities 3, 5, and 14.)	7. Provide suitable areas for ORV use. (Addresses P 35, 36, and 40, and C16.)	C, F_1, F_2, G_1, G_2
P39. De-emphasize driving for pleasure. (See Opportunities 3, 5, and 13.)	8. Curtail road building. (Addresses P 4, 8, 37, and 103.)	A_1, A_2, H, 8_a through 8_h, L_1, M, N_1, O, R
P40. Put more emphasis on driving for pleasure. (See Opportunities 1, 2, 7, and 11.)	9. Provide a generally unmodified Forest environment. (Addresses P 8.)	G_2, H, 8_a through 8_h, L_1, L_2, M, N_1, N_2, N_3, O, R
P42. Reduce or do not upgrade road standards. (See Opportunities 5 and 10.)	10. Use travel restrictions and regulations in lieu of road reconstruction to resolve use conflicts. (Addresses P 42.)	A_1, A_2, B, C, D, E, F_1, F_2
P102. We want access to and use of our National Forest. (See Opportunities 1, 2, and 12.)	11. Provide more roadside recreational opportunities. (Addresses P 40 and C 1.)	D, J, Q
P103. Reduce or restrict access sharply to protect our Forest. (See Opportunities 3, 8, 13, and 14.)	12. Determine and acquire needed rights-of-ways. (Addresses P 102 and C 53.)	Forest-wide Management Requirements - Land Ownership
	13. Restrict ORV use. (Addresses P 4, 32, 39, and 103 and C 16.)	H, 8_a through 8_h, O, prohibit ORV's; all others restrict to varying degrees
	14. Continue and/or increase road closure and obliteration programs. (Addresses P 38 and 103 and C 16.)	A_1, A_2, C, G_1, G_2, H; Forest-wide Management Requirements - Soil and Water

PLANNING QUESTION V (Continued)

What Kind of Transportation System is Necessary to Serve Future Resource Management and Public Needs?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C1. Resource damage, overcrowding, and parking problems are resulting in some locations leading to dispersed recreation areas. (See Opportunities 4 and 11.)		
C13. Present trail locations and standards do not adequately meet the needs of the public. (See Opportunities 1, 2, and 6.)		
C14. Many roads providing access to heavily used recreation areas are not constructed or maintainted consistent with the use. (See Opportunities 1 and 6.)		
C15. Too much emphasis may be given to constructing new roads, rather than properly maintaining the existing roads. (See Opportunity 6.)		
C16. The uncontrolled and increasing level of ORV use is and will continue to result in unacceptable erosion. (See Opportunities 3, 5, 7, 13, and 14.)		
C17. Road closures restrict access to firewood. (See Opportunities 1, 2, 4, and 6.)		
C18. There is an increasing demand for firewood, which is becoming scarce in accessible areas. (See Opportunities 1, 2, 4, and 6.)		
C19. Very few accessible areas for Christmas tree cutting exist to meet the rapidly increasing demand. (See Opportunities 1, 2, 4, and 6.)		
C53. Access to National Forest land is being blocked by private landowners. (See Opportunities 2 and 12.)		

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore, because of timber sales... (See Opportunities 7, 10, and 24.)	1. Permit fuelwood cutting in timber sale areas. (Addresses P 46 and 72 and C 17, 18, and 24.)	B, C, D, E, F_1, F_2
P38. Close and restore timber access roads. (See Opportunity 8.)	2. Increase reforestation efforts to ensure success. (Addresses P 44 and 45 and C 21, 32, and 34.)	Forest-wide Management Requirements - Timber
P44. Clean up and reforest logging areas and prevent erosion. (See Opportunities 2, 7, and 12.)	3. Make Christmas trees, house logs, and other products available through intermediate harvests. (Addresses P 46, 59, and 61.)	B, C, D, E, F_1, F_2, G_1, P_1
P45. We want areas that have been cutover to be reforested, so we will always have trees and wood products. (See Opportunities 2 and 25.)	4. Designate more wildlife trees. (Addresses C 24.)	B, D, E, F_1, F_2
P46. We want firewood, Christmas trees, house logs, and other Forest products to be available for use locally. (See Opportunities 1, 3, 9, and 14.)	5. Minimize protection of wildlife trees. (Addresses P 72 and C 18 and 24.)	A_1, A_2, C,
P47. Prohibit local use for firewood, Christmas trees, log houses, etc.; timber harvest should be on a national need only. (See Opportunity 25.)	6. Harvest timber via uneven-aged management. (Addresses P 48.)	M, N_3; Portions of B, D, E, F_1, F_2, G_1
P48. Do not permit clearcutting. (See Opportunities 6 and 10.)	7. Increase timber sale area cleanup. (Addresses P 8 and 44.)	Forest-wide Management Requirements - Timber
P49. Harvest timber. (See Opportunity 25.)	8. Continue and/or increase road closure and obliteration programs. (Addresses P 38.)	A_1, A_2, C, G_1, G_2, H; Forest-wide Management Requirements - Soil and Water
P50. Do not harvest timber. (See Opportunity 24.)	9. Encourage firewood gathering in oakbrush manipulation areas. (Addresses P 46 and 72 and C 17, 18, and 24.)	A_1, A_2, B, E, F_1, F_2
P51. Timber should be harvested economically. (See Opportunity 22.)	10. Modify timber cutting in foreground areas to leave featured trees, screen visual distractions, and improve landscape viewing. (Addresses P 8 and 48.)	B, F_1, F_2, G_1, J
P53. The supply of timber needs to be more consistent and of higher quality. (See Opportunity 25.)	11. Schedule reforestation to minimize conflicts with wildlife and livestock. (Addresses P 77 and C 25, 26, 28, and 40.)	B, D, E, F_1, F_2
P59. Use the National Forest to improve our economy. (See Opportunities 3, 22, 23, and 25.)	12. Modify timber cutting practices on soil problem areas. (Addresses P 44 and 114 and C 21.)	Forest-wide Management Requirements - Soil and Water
P61. We need more employment in Forest-related industries. (See Opportunities 3, 22, 23, and 25.)	13. Modify site preparation methods where adverse effects occur. (Addresses C 33.)	Forest-wide Management Requirements - Soil and Water

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P62. We do not need more employment in the local timber industry. (See Opportunity 24.)	14. Plant and manage areas for Christmas trees. (Addresses P 46 and C 19.)	B, F_2, G_1
P72. Wildlife tree policy is becoming too restrictive for firewood gathering. (See Opportunities 1, 5, and 9.)	15. Schedule timber harvests to provide and maintain vegetation diversity for a wide variety of wildlife species and to alleviate concentrated cutting in two few areas. (Addresses C 20, 26, and 28.)	B, D, E, F_1, F_2, G_1
P77. We depend on the National Forest to run our livestock. It is getting to be more difficult and costly to do, because of conflicts with activities such as reforestation..... (See Opportunities 11 and 20.)	16. Design sales to specifically emphasize resources other than timber. (Addresses C 26 and 27.)	A_1, A_2, B, D, E, F_1, F_2, G_1, J, P_1
P114. More timber should be offered for cable logging program over and above the regular sale offering. (See Opportunities 12, 22, 25, 26.)	17. Provide increased access to Forest lands. (Addresses C 17, 18, and 19.)	B through G_2, I, J
C17. Road closures restrict access to firewood. (See Opportunities 1, 9, and 17.)	18. Reduce livestock numbers and/or seasons. (Addresses C 40.)	E, F_1, F_2, M, R
C18. There is an increasing demand for firewood which is becoming increasingly scarce in accessible areas. (See Opportunities 1, 5, 9, and 17.)	19. Restrict livestock grazing in plantations. (Addresses C 40.)	C, D, E, F_1, G_1, J, P_1
C19. Very few accessible areas for Christmas tree cutting exist to meet the rapidly increasing demand. (See Opportunities 14 and 17.)	20. Compensate for some livestock damage by planting more trees per acre. (Addresses P 77 and C 40.)	B, F_2, G_1
C20. We have been concentrating cutting in too few areas because of having to meet timber targets within the restrictions of not entering roadless areas. (See Opportunity 15.)	21. Develop a tree management program to enhance other resource values. (Addresses C 26, 27, and 29.)	B, D, E, F_1, F_2, G_1, J, P_2, Q
C21. We are cutting in some areas with soil and vegetation problems which are difficult to solve. (See Opportunities 2 and 12.)	22. Initiate research in methods to more fully utilize and market low-value wood products. (Addresses P 51, 59, 61 and 114 and C 22, 27, 29, 30, 31, and 35.)	Forest-wide Management Requirements - Timber
C22. The necessity to cover road development costs results in the de-emphasis of small sales, which are needed to meet the objectives of other resource programs and the needs of small timber operators in the area. (See Opportunities 22 and 23.)	23. Use KV and timber funds to manage vegetation for nontimber resources. (Addresses P 59 and 61 and C 22, 27, 29, and 30.)	Forest-wide Management Requirements - Timber
	24. Permit timber harvesting only for salvage, insect and disease control, or for other resource enhancement requirements. (Addresses P 8, 50, and 62.)	A_1, A_2, G_2, H, I, J, L_1, L_2, M, N_1, N_2, N_3, Q^2
	25. Manage areas for optimum sawtimber production. (Addresses P 45, 47, 49, 53, 59, 61, and 114 , and C 30.)	B, C, D, E, F_1, F_2, G_1
	26. Cooperate with industry to develop an orderly program which will encourage investment into specialized logging equipment. (Addresses C 23 and P 114.)	Forest-wide Management Requirements - Timber

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C23. More sophisticated timber harvesting techniques such as cable systems involve high planning and layout costs, which local industry is unwilling/unable to operate. (See Opportunity 26.)		
C24. In accessible areas there is a conflict between cutting snags for firewood or leaving them for wildlife purposes. (See Opportunities 1, 4, 5, and 9.)		
C25. Reforestation impacts large areas of wildlife escape cover and habitat. (See Opportunity 11.)		
C26. Apparent conflicts exist between wildlife habitat and timber management activities. (See Opportunities 11, 15, 16, and 21.)		
C27. The timber program lacks flexibility to improve other resources because of volume targets. (See Opportunities 16, 21, 22, and 23.)		
C28. Concentration of vegetation manipulation projects and spaced (in time) application of management practices in the same geographical area... may be causing adverse long-term effects. (See Opportunities 11 and 15.)		
C29. The objectives of timber management and other related resources are not totally compatible. To meet volume objectives, sales must be scheduled in areas which do not need wildlife habitat improvement and in some cases detract from wildlife values. Conversely, areas needing wildlife habitat improvement often yield products which are uneconomical to harvest. (See Opportunities 21, 22, and 23.)		
C30. In many cases there are low economic returns due to frequent occurrences of low value timber associated with high development costs necessary for harvesting. (See Opportunities 22 and 25.)		

How Should the San Juan National Forest Manage Its Tree Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C31. We are thinning where there is a question of positive B/C values when all other factors, both tangible and intangible, are considered. (See Opportunity 22.)		
C32. The economic efficiency of reforestation efforts on the San Juan National Forest appears to be questionable. (See Opportunity 2.)		
C33. Very intensive site preparation methods which appear to be necessary to ensure plantation success in the ponderosa pine zone may be having adverse site effects. (See Opportunity 13.)		
C34. Past regeneration efforts on high elevational sites have had limited success. (See Opportunity 2.)		
C35. Post and pole markets are poor, which results in inadequate treatment of overstocked pole stands. (See Opportunity 22.)		
C40. Conflicts exist between maintaining livestock carrying capacity and the reforestation program. (See Opportunities 11, 18, 19, and 20.)		

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P65. Protect our wildlife. (See Opportunities 1, 3, 4, 5, 13, and 14.)	1. Identify and initiate efforts for land acquisition to acquire winter range, migration routes, and stream-side lands. (Addresses P 65, 69, 70, 71, 74, and 88 and C 38 and 39.)	E, F_1, F_2, M
P66. Preserve endangered wildlife species. (See Opportunity 4.)	2. Improve fisheries habitat. (Addresses P 71 and 88 and C 39.)	M
P67. Non-game species should be given more consideration and protection. (See Opportunities 3, 4, 5, 7, 8, and 13.)	3. Develop special protective measures for sensitive areas. (Addresses P 65, 67, 71, and 88 and C 39.)	M and Forest-wide Management Requirements - Soils, Visual Management
P69. Maintain and increase, where possible, our wildlife, especially big game. (See Opportunities 1, 5, 7, 10, 11, and 14.)	4. Restrict human use in specified wildlife areas. (Addresses P 65, 66, 67, and 88 and C 36.)	Best in E, F_1, F_2; also in A_1, A_2, B, D,
P70. New subdivisions and increased use of private lands are depleting historic winter ranges and blocking migration routes of wildlife. (See Opportunity 1.)	5. Maintain acceptable vegetation diversity for a wide variety of species of wildlife (consider whole ecosystems in our management). (Addresses P 65, 67, 69, and 88 and C 25, 26, 28, and 38.)	B, D, E, F_1, F_2, G_1
P71. I would like to see more trout fishing. (See Opportunities 1, 2, and 3.)	6. Improve livestock distribution and use. (Addresses P 77 and C 38.)	All prescriptions allowing grazing; best in A_1, A_2, B, D, F_1, and F_2
P72. Wildlife tree policy is becoming too restrictive for firewood gathering. (See Opportunity 9.)	7. Improve watershed and riparian habitat conditions. (Addresses P 67, 69, and 88 and C 39.)	M improves riparian areas; A_1, A_2, B, E, F_1, F_2 will improve watersheds
P74. Herds need decreasing because private landowners are furnishing a large amount of feed for elk and deer. (See Opportunities 1, 10, 11, and 14.)	8. Designate more wildlife trees. (Addresses P 67 and C 24.)	B, D, E, F_1, F_2
P77. We depend on the National Forest land to run our livestock. It is getting to be more difficult and costly to do, because of conflicts with activities such as reforestation and recreation, and because of big game competition, access needs, lack of predator control, and restrictions on improvements. (See Opportunity 6.)	9. Minimize protection of wildlife trees. (Addresses P 72 and C 24.)	A_1, A_2, C,
	10. Reduce livestock numbers or seasons. (Addresses P 69 and 74 and C 38.)	E, F_1, F_2, M, R
P88. Protect areas around lakes, rivers, and streams. (See Opportunities 1, 2, 3, 4, 5, and 7.)	11. Provide forage for wildlife on winter range. (Addresses P 69 and 74 and C 38.)	B, E, F_1, F_2
	12. Initiate research in methods to more fully utilize low-value wood products. (Addresses C 22, 27, and 29.)	Forest-wide Management Requirements - Timber
	13. Develop a timber program that enhances other resource values, including wildlife habitat. (Addresses P 65 and 67 and C 22, 26, 27, and 29.)	B, D, E, F_1, F_2, G_1, J, P_1

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C22. Large sales are often necessary to cover road development costs resulting in the de-emphasis of small sales which are often required to meet objectives of other resource programs and the needs of small timber operators in the area. (See Opportunities 12, 13, and 15.)	14. Improve quality and quantity of big game winter habitat on Forest Service lands. (Addresses P 65, 69, and 74 and C 38.)	B, E, F_1, F_2
C24. In accessible areas there is a conflict between cutting snags for firewood or leaving them for wildlife purposes. (See Opportunities 8 and 9.)	15. Use KV and timber funds to manage vegetation for non-timber resources. (Addresses C 22, 27, and 29.)	Forest-wide Management Requirements - Timber
C25. Reforestation impacts large areas of wildlife escape cover and habitat. (See Opportunities 5 and 13.)		
C26. Apparent conflicts exist between wildlife habitat and timber management activities. (See Opportunities 5 and 13.)		
C27. The timber program lacks flexibility to improve other resources because of volume targets. (See Opportunities 12, 13, and 15.)		
C28. Concentration of vegetation manipulation projects and spaced (in time) application of management practices in the same geographical area, i.e., burning, roller chopping, root plowing, may cause adverse long-term effects. (See Opportunity 5.)		
C29. The objectives of timber management and other related resources are not totally compatible to meet volume objectives. Sales must be scheduled in areas which do not meet wildlife habitat improvement and in some cases detract from wildlife values. Conversely, areas needing wildlife habitat improvement often yield products which are uneconomical to harvest. (See Opportunities 12, 13, and 15.)		
C36. Dispersal of people conflicts with wildlife, i.e., solitude, calving areas, migration routes, etc. (See Opportunity 4.)		

What is the Role of the San Juan National Forest in Providing Wildlife Habitat?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C38. Conflicts exist between domestic livestock and wildlife in lower areas where summer use of forage by livestock is in competition with winter forage needs by big game animals. (See Opportunities 1, 5, 6, 10, 11, and 14.)		
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water, riparian habitats, high meadows, and sensitive soils. (See Opportunities 1, 2, 3, and 7.)		

PLANNING QUESTION VIII

What is the Role of the San Juan National Forest in Providing for Grazing of Domestic Livestock?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P60. Continue livestock grazing to make effective use of the Forest for economic betterment of the area. (See Opportunities 1 and 2.)	1. Improve livestock distribution and use. (Addresses P 60, 78, 79, and 83 and C 38, 40, and 49.)	All prescriptions allowing grazing; best in A_1, A_2, B, D, F_1 and F_2
P77. We depend on the National Forest land to run our livestock. It is getting to be more difficult and costly to do, because of conflicts with activities such as reforestation, recreation, big game competition, lack of predator control, and restrictions on improvements. (See Opportunities 2, 4, 5, and 13.)	2. Improve the quality and quantity of livestock forage. (Addresses P 60, 77, 78, 79, and 83 and C 38 and 40.)	A_1, A_2, B
P78. Protect against overgrazing. (See Opportunities 1, 2, 3, and 7.)	3. Develop special management for sensitive areas. (Addresses P 78, 79, and 80 and C 39 and 49.)	M and Forest-wide Management Requirements - Soils, Visuals
P79. Sheep, cattle, and horses are interfering with recreation experiences and damaging resources. (See Opportunities 1, 2, 3, 5, 6, 7, and 12.)	4. Control noxious weeds and predators in cooperation with counties and others. (Addresses P 77 and 82.)	Forest-wide Management Requirements; All prescriptions
P80. Do not allow grazing. (See Opportunities 3 and 6.)	5. Alert recreationists to where livestock concentrate. (Addresses P 77 and 79 and C 5.)	A_1, A_2, B, D, F_1, F_2
P83. There are too many range fences; leads to cattle being in concentrated areas. (See Opportunities 1 and 2.)	6. Restrict livestock grazing in riparian areas. (Addresses P 79 and 80 and C 5 and 39.)	M
C5. Specific conflicts exist between the recreating public and domestic livestock grazing along streams or in open meadows that are used by people. (See Opportunities, 5, 6, 7, 12, and 13.)	7. Reduce livestock numbers and/or seasons. (Addresses P 78 and 79 and C 5, 38, 39, 40, and 49.)	E, F_1, F_2, M, R
C38. Conflicts exist between domestic livestock and wildlife in lower areas where summer use of forage by livestock is in competition with winter forage needs by big game animals. (See Opportunities 1, 2, 7, and 11.)	8. Restrict livestock grazing in plantations. (Addresses C 40.)	C, D, E, F_1, G_1, J, P_1
	9. Schedule reforestation and harvest to minimize acreage needing protection in any one allotment. (Addresses C 40.)	B
	10. Compensate for some livestock damage by planting more trees per acre. (Addresses C 40.)	B, F_2, G_1
	11. Provide forage for wildlife on winter range. (Addresses C 38.)	B, E, F_1, F_2
	12. Improve riparian habitats. (Addresses P 79 and C 5 and 39.)	M
	13. Control human use to minimize conflicts with grazing use. (Addresses P 77 and C 5.)	A_1, A_2, B, D,

What is the Role of the San Juan National Forest in Providing for Grazing of Domestic Livestock?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water quality, riparian habitats, high meadows, and sensitive soils. (See Opportunities 3, 6, 7, and 12.)		
C40. Conflicts exist between maintaining livestock carrying capacity and the reforestation program. (See Opportunities 1, 2, 7, 8, 9, and 10.)		
C49. Sheep grazing in the high country may be an adverse non-point source of water pollution. (See Opportunities 1, 3, and 7.)		

PLANNING QUESTION IX

How Should the San Juan National Forest Respond to the Increasing Demands for High-Quality Water?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P87. We want clean, pure water coming from the National Forest in sufficient quantities for municipal, agricultural, recreational, and local uses. (See Opportunities 1, 2, 3, and 4.)	1. Maintain watershed conditions. (Addresses P 87, 88, and 89.)	Forest-wide Management Requirements - Soil & Water
P88. Protect areas around rivers, streams, and lakes. (See Opportunities 1, 2, 5, and 6.)	2. Improve watershed and riparian habitat conditions. (Addresses P 87, 88, and 89 and C 39 and 45.)	M improves riparian areas ; A_1, A_2, B, E, F_1, F_2 will improve watersheds
P89. Preserve soil and water. (See Opportunities 1 and 2.)	3. Ensure instream flows on selected streams. (Addresses P 87 and C 41 and 42.)	M, P_1, P_2
C39. Degradation of forage from grazing in some cases is causing unacceptable impacts on water, riparian habitats, high meadows, and sensitive soils. (See Opportunities 2, 5, and 6.)	4. Augment water yields on the San Juan. (Addresses P 87 and C 41 and 42.)	B, P_1, P_2
C41. The Forest may be impacted by projects such as the Animas-La Plata and East Fork San Juan diversions. (See Opportunities 3 and 4.)	5. Identify and initiate efforts for land acquisition to acquire streamside lands. (Addresses P 88 and C 39.)	M
C42. There is an increasing number of water use applications on the Forest, many of which are apparently in conflict with our instream flow needs. (See Opportunities 3 and 4.)	6. Develop special protective measures for sensitive areas. (Addresses P 88 and C 39.)	M and Forest-wide Management Requirements - Soils, Visuals
C45. Mine acid drainage is affecting water quality in some areas. (See Opportunity 2.)		

PLANNING QUESTION X

What is the Role of the San Juan National Forest in Regard to the Identification, Protection, and Use of Cultural Resources?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P95. Protect America's heritage and let us learn about the past. (See Opportunity 4.)	1. Allow public use of Chimney Rock in a manner that considers the economy of the Southern Ute Tribe. (Addresses P 96 and C 37.)	L_1, L_2
P96. Many people want to see the outstanding Indian ruins restored at Chimney Rock and at the same time assist the Southern Utes to improve their economy. (See Opportunity 1.)	2. Increase our cultural resource inventory efforts. (Addresses C 43.)	Forest-wide Management Requirements - Cultural
P97. We don't need to try to protect every archaeological resource. (See Opportunity 3.)	3. Determine the relative significance of cultural resource properties, with emphasis on the problem of "isolated finds." (Addresses P 97 and C 47 and 48.)	Forest-wide Management Requirements - Cultural
C37. The legal mandate to protect and manage the peregrine falcon habitat (endangered species) and the archaeological resources at Chimney Rock conflict with an increasing demand for public recreation in the same area. (See Opportunities 1 and 4.)	4. Increase inventory, protection and other Cultural Resource Management use efforts. (Addresses P 95 and C 37, 43, and 48.)	Forest-wide Management Requirements - Cultural
C43. The lack of cultural resource inventory is delaying other resource management activities. (See Opportunities 2 and 4.)	5. Seek designation of suitable Archaeological Districts as Research Natural Areas (Addresses P 95 and C 48)	0
C47. Failure to determine the significance of isolated finds (individual arrowheads, scattered lithics, etc.) continues to conflict with other resource practices. (See Opportunity 3.)		
C48. Cultural resource properties are "time capsules" with research potential for helping to answer Forest management and academic questions. (See Opportunities 3, 4, and 5.)		

PLANNING QUESTION XI

How Should the San Juan National Forest Respond to Mineral Resource Development?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore because of timber sales, utility lines, road corridors, and other things. (See Opportunity 2.)	1. Provide for the development of mineral and energy resources. (Addresses P 98 and 100.)	Forest-wide Management Requirements - Minerals
P98. We need minerals and energy products, yet we also want to minimize the bad impacts of the mining operations. (See Opportunities 1 and 2.)	2. Mitigate resource damage. (Addresses P 8, 98, and 100 and C 44, 45, and 46.)	Forest-wide Management Requirements - Minerals
P100. We need minerals and energy. Do not restrict exploration. (See Opportunities 1 and 2.)	3. Improve coordination in planning and decision-making with local, State, and other Federal agencies. (Addresses C 44 and 45.)	Forest-wide Management Requirements - Minerals
C44. Outstanding mineral rights held by the State on Junction Creek and other outstanding mineral rights limit our management options in preventing or reducing impacts when these minerals are extracted. (See Opportunities 2 and 3.)	4. Identify areas where little or no conflict exists between mining and other uses and resources. (Addresses C 46.)	Forest-wide Management Requirements - Minerals
C45. Mine acid drainage is affecting water quality in some areas. (See Opportunities 2 and 3.)		
C46. Existing mining laws grant certain statutory rights that limit our management options. (See Opportunities 2 and 4.)		

PLANNING QUESTION XII

How Should the San Juan National Forest Respond to the Increasing Demand for Special Uses and Land Adjustments?

Public Issues (P) and Management Concerns (C)	Management Opportunities	Applicable Management Prescriptions
P8. The scenery isn't as nice anymore because of ... utility lines, road corridors, and other things. (See Opportunities 1 and 2.)	1. Anticipate and plan utility corridors where appropriate. (Addresses P 8 and C 51.)	Forest-wide Management Requirements - Special Uses
P102. We want access to, and use of, our National Forests. (See Opportunities 2, 5, 6, and 7.)	2. Cooperate with other agencies to resolve land ownership, access, and utility corridors problems. (Addresses P 8 and 102 and C 51 and 53.)	Forest-wide Management Requirements - Special Uses, Land Management
C50. Some existing summer homes under special use permits may (now and future) conflict with other public use of greater benefit. (See Opportunity 3.)	3. Assess summer home groups against potential greater public need and benefit. (Addresses C 50.)	Forest-wide Management Requirements - Special Uses
C51. The demand for utility corridors across the San Juan National Forest is increasing rapidly, because of the need for regional and national energy distribution. (See Opportunities 1 and 2.)	4. Identify Forest boundaries. (Addresses C 52.)	Forest-wide Management Requirements - Land Management
C52. Occupancy trespass is occurring because National Forest boundaries are not surveyed or marked. (See Opportunity 4.)	5. Increase mobility and efficiency throughout the transportation system. (Addresses P 102 and C 53.)	All prescriptions (best in prescriptions emphasizing commodity production B through F_2)
C53. Access to National Forest land is being blocked by private landowners. (See Opportunities 2, 5, 6, and 7.)	6. Provide increased access to Forest lands. (Addresses P 102 and C 53.)	B through G_2, I, J
	7. Determine and acquire needed rights-of-way. (Addresses P 102 and C 53.)	Forest-wide Management Requirements - Land Management

APPENDIX D

MANAGEMENT PRESCRIPTIONS
USED IN FORMULATION OF ALTERNATIVES
BUT NOT APPLIED IN THE PREFERRED ALTERNATIVE

PRESCRIPTION FOR MANAGEMENT AREA C

This prescription is designed to achieve high level wood fiber production.

Emphasis is upon wood production and utilization, resulting in extensive modification of tree and other vegetative cover. High investments to maintain or increase timber production and utilization will be made. Investments for non-timber resources will be made provided wood fiber production is not reduced. Opportunities for "Rural" recreation activities, livestock grazing, and wildlife management will be limited. Only management activities compatible with the prescription's wood fiber emphasis will take place. System roads will be managed for high density. Road maintenance costs will be average.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Inventories, Evaluation, Protection (A02; 306, 307, 308)	See Forest-wide Management Requirements.	
Cultural Resource Enhancement (A02; 309)	Allow recreation and non-recreation use of suitable cultural resource properties to the extent that such uses do not conflict with wood fiber production. Limit interpretation to low cost developments such as interpretive signing.	
Visual Resource Management (A03, A04)	Meet the visual quality objective of "Maximum Modification" as a minimum for all activities.	
Dispersed Recreation (A14, A15)	Manage the recreation resource to provide "Rural" recreation opportunities. 1. Permit non-motorized recreation activities year-round throughout the area (Refer to management activities under "Facilities" for additional direction relating to roads and trails.) 2. Restrict use to resolve people/wood fiber production conflicts in favor of high fiber output. 3. Use firewood gathering as a means to more fully utilize wood fiber.	
WILDLIFE		
Non-structural and Structural Wildlife Habitat Improvement (C03, C06)	Limit investments in wildlife habitat projects to those that do not cause immediate or long-term reductions in wood fiber production. Site-specific diversity objectives or indicator species management for wildlife will not be achieved in the land area under this prescription. Favor indicator species through timber management activites where possible.	Turkey, Deer Mouse, Sharptail Grouse, Mallard and Green-tailed Towhee: 1. Provide two water sources/section in deficient low elevation areas, where water is less than one source/section.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	Deer, Elk, and Bear: 1. Regenerate aspen clones in small scattered sites where they can be protected from livestock grazing by plantation protection fences. 2. Schedule silvicultural activities so that calving and fawning areas are not unduly disrupted during the last two weeks of May and the first two weeks of June.	2. Fence one-third of every one out of three livestock reservoirs to protect lacustrine nesting habitat for small and non-game birds and mammals. Goshawk: Prohibit management activities within 300 feet of any occupied raptor nest during of May 1 through July 31. Hairy Woodpecker, Mountain Bluebird: Retain unmerchantable snags that have been dead longer than five years. See the Vegetation Management and Diversity Section at the end of this prescription for additional standards and guidelines.
RANGE Range Resource Management (D02)	Manage suitable vegetation types for incidental livestock production. Reduce or exclude permitted livestock, if necessary, to provide the desired degree of protection to regenerating areas. Manage livestock to utilize available forage and to maintain forage vigor while not degrading timber production. 1. Exclude livestock from plantations and naturally revegetating areas by pasture management, techniques such as using existing pasture fences, herding, riding or additional fencing at the permittee's expense, if they so desire. 2. Improve livestock distribution through herding, riding, salting, and livestock pest control. 3. Maintain predatory animals as a viable part of the fauna. Control only those predatory animals causing undue predation on other wildlife or livestock. Limit control to nonchemical means and restrict control in human use areas.	Utilize 20 percent of usable forage production for livestock in non-regenerating areas.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	4. Allow grazing to occur where compatible with wood fiber production with simple management systems such as season-long or deferred grazing. Institute improved management systems such as rest-rotation or deferred rotation where there is minimum wood fiber production potential. 5. Construct and maintain trails and travel routes.	
Range Forage Improvement (D03)	Do not use range cultural practices such as planting or vegetation manipulation to improve forage composition or production.	
Range Structural Improvements (D05) and Maintenance (D06)	Construct and maintain allotment boundary fences, drift fences and water developments necessary to implement management systems.	
TIMBER	Manage lands suitable for timber production to maximize production of wood products for the following tree species and silvicultural systems. 1. Ponderosa pine on available and capable lands above 40 square feet B.A. and below 30 percent slopes with even-age (shelterwood) systems. Ponderosa pine sites which are presently non-stocked (an existing condition of less than 40 square feet of basal area per acre or equivalent stocking) or above 30 percent slope are considered unsuitable for timber production because of regeneration difficulties. This "unsuitable for timber production" determination does not apply to stands which may be brought below this stocking level through management prescribed in the Vegetation Management and Diversity Section at the end of this prescription. The management prescribed there is designed to provide reasonable assurance that the lands can be adequately restocked. 2. Other tree species on all available and capable lands with even-age (clearcut) systems.	See Vegetation Management and Diversity Section at the end of this prescription for standards and guidelines.
WATER	See Forest-wide Management Requirements.	
MINERALS AND GEOLOGY		
Mining Law Compliance and Administration (G01)	See Forest-wide Management Requirements.	

3. High resource sensitivity based on:

   a. Slopes steeper than 60 percent;

   b. High erosion hazard;

   c. High geologic hazard.

An exception to the above is where the conditions occur within one-half mile of areas which can be leased with surface use or occupancy. For these situations, recommend for leasing subject to no surface use or occupancy. Forest Service (R-2) Supplement F to Form 3109-3, "Surface Use or Occupancy Stipulation," will apply to these areas.

Recommend for or consent to issuance of leases allowing surface disturbance for areas on which none of the above situations occur. Include standard stipulations (BLM Form 3109-3, "Stipulation For Lands Under Jurisdiction of Department of Agriculture" and Forest Service (R-2) Supplement D to Form 3109-3, "Surface Disturbance Stipulation") in all leases.

LANDS

Land Exchange and Acquisition (J13, J15); Rights-of-Way Acquisition (J18)	Acquire intermingled lands of other ownerships on a case-by-case basis, especially those which would reduce or eliminate boundary problems or are of high potential for wood fiber production. National Forest lands within the area covered by this prescription will not be available for exchange unless they consist of isolated parcels or are extrusions into the private lands. Assure access to areas to be managed for wood fiber production through rights-of-way acquisition.
Special Use Management (Non-Recreation)(J01)	Allow special land uses provided they do not adversely affect wood fiber production. Grant permits for occupancy and use for wood fiber management and access. Consider other uses on a case-by-case basis relative to their impact on wood fiber production.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
SOILS	See Forest-wide Management Requirements.	
FACILITIES		
Local Road Construction, Reconstruction, and Maintenance (L12, L13, L19)	Construct and maintain roads and trails to enhance wood fiber production. Design facilities and practices to provide maximum economy of timber harvest and other wood fiber related activities.	1. Maintain trails to a maintenance level two. 2. Manage the area for a high density (two to four miles/square mile) of system roads. 3. Maintain local constant roads to maintenance level three. 4. Maintain local intermittent roads to a maintenance level two when open for project activities.
Trail Construction/ Reconstruction and Trail System Management (L22, L23)	1. Allow motorized travel off development roads and trails except for area closures where unacceptable damage to regenerating areas, seedling and sapling stands would occur. 2. Manage local constant use roads to accommodate medium-light, seasonal use (SADT 10-50); construct with gravel support needed for timber operations and hauling. Regulate seasonal public use by closure if roadbed damage will occur. 3. Manage local intermittent roads to accommodate light use (SADT 0-20). Construct with no gravel support unless needed to extend logging season. Close roads to public use.	
PROTECTION	See Forest-wide Management Requirements.	See the Vegetation Management and Diversity Section at the end of this prescription for prescribed fire standards and guidelines.
VEGETATION MANAGEMENT AND DIVERSITY		Use the following chart for standards and guidelines for managing vegetation for all resource objectives. Use the specified regeneration silvicultural practices for the respective species at least 80 percent of the time. Specific site characteristics may require some other regeneration silvicultural practice in some areas.

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT: Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	UNDERSTORY MANAGEMENT
Ponderosa pine	Below 30%	Above 40 or Stocked	Manage 100% of area to 100 GSL for maximum timber production. Indicator species benefiting would be: ruby-crowned kinglet, mountain bluebird, western bluebird, gray headed juno. 120-year rotations.	2-step shelterwood on at least 80% of the area. Reduce the stand to 40 basal area at the time of shelterwood seed cut. Make removal cut when regeneration is established. When another harvest system is necessary due to specific site characteristics, use group selection below 1 acre in size.	Commercially thin at 30-year intervals.	Burn at 10-year intervals starting at age 30.	At regeneration cut, use mechanical site/preparation (brush rake and disc) with expectation of 50% natural regeneration and 50% planting of 680 trees/acre.	None
	Below 30%	Below 40 or Non-Stocked	No diversity objectives are planned. Natural succession will take place.	Salvage existing trees when compatible with timber objectives.	None	None	None	None
	30-60%	All	This prescription is not suitable for these slopes. For small inclusions of this slope class, use the same direction as above.					
	Above 60%	All	Same as above.					
Aspen	All	All	Manage 100% under an 80-year rotation to favor wildlife management indicator species; deer, elk, hairy woodpecker and for increased water yield.	Clearcut in blocks up to 40 acres. Clearcut entire clones.	None	None	Natural regeneration without site preparation.	
Interior Douglas-fir	Below 30%	Below 40 or Non-Stocked	Regenerate 100% of area for maximum timber production.	Clearcut and regenerate.	None	None	Burn logging debris. Plant clearcuts with 680 trees/acre immediately following harvest.	None

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT				UNDERSTORY MANAGEMENT
				Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	
Interior Douglas-fir	Below 30%	Above 40 or Stocked	Manage 100% of area to 120 GSL for maximum timber production. Indicator species benefiting would be deer and elk.	Patch clearcut below 10 acres with no more than 400 feet in width for seed dispersal.	Commercially thin at 30-year intervals.	None	At regeneration cut, use mechanical site preparation. Plant clearcuts with 680 trees/acre immediately following harvest where ponderosa pine is to be favored. Plan on natural regeneration for other species.	None
	30-60%	Below 40 or Non-Stocked	Regenerate 100% of area for maximum timber production.	Clearcut and regenerate.	None	None	No mechanical site preparation. Burn logging debris. Plant clearcuts with 680 trees/acre immediately following harvest.	None
	30-60%	Above 40 or Stocked	See interior Douglas-fir, slopes below 30%, BA above 40. The same direction applies for this slope class, except that prescribed fire is to be used for site preparation instead of mechanical methods.					
	Above 60%	All	Same as above.					
Engelmann spruce-subalpine fir	Below 30%	Below 40 or Non-Stocked	See interior Douglas-fir, slopes below 30%, BA below 40.					
	Below 30%	Above 40 or Stocked	Manage 100% of area to 120 GSL for maximum timber production. Indicator species benefiting would be deer and elk.	Patch clearcut below 10 acres with no more than 400 feet in width for seed dispersal.	Commercially thin at 30-year intervals.	None	Burn logging debris and use mechanical site preparation. Plant clearcuts with 680 trees/acre immediately following harvest.	None

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT				UNDERSTORY MANAGEMENT
				Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	
	30-60%	Below 40 or Non-Stocked	See interior Douglas-fir, slopes 30%-60%, BA below 40.					
	30-60%	Above 40 or Stocked	See Engelmann spruce-subalpine fir, slopes below 30%, BA above 40. Everything is the same except that there is no mechanical site preparation.					
	Above 60%	All	Same as above.					
Pinon pine juniper	All	N/A	This type is not suitable for timber production. No diversity objectives are planned. Natural succession will take place.					
Gambel oak	All	N/A	Same as above.					
Mixed browse	All	N/A	Same as above.					
Grassland	All	N/A	Same as above.					

PRESCRIPTIONS FOR MANAGEMENT AREAS 8_e, 8_f, 8_g, AND 8_h

These prescriptions provide for wilderness management in accordance with the Wilderness Act of 1964, Public Law 93-632, 1/5/75, and Public Law 96-560, 12/22/80. Under these prescriptions, visitor numbers and activities will be controlled through restrictions within designated zones, area closures, and other relatively intensive behavior modification techniques to retain maximum integrity of wilderness environments. In these prescriptions, restrictions are imposed on the different wilderness management areas. Direct management of visitor behavior through regulation is emphasized. The objective of these prescriptions is to provide predominantly untrammeled natural environments of the physical, biological and social components of wilderness. The physical and biological components are managed so that natural processes are unimpeded by human activity and use. Inherent biological processes show essentially no influence of man. Natural processes, including naturally occurring fire, soil erosion and insect and disease cycles, proceed unrestricted by human activities.

Opportunities are provided for users to experience essentially unmodified natural ecosystems. Emphasis is on isolation from the sights and sounds of mechanized human activities, solitude, self-reliance and challenge while traveling cross-country or on established trails of varying degrees of difficulty. The degree of solitude and travel difficulty is more specifically described in the management direction given in management prescriptions for Transition, Semi-Primitive, Primitive and Pristine recreation opportunities.

Other resource activities authorized by wilderness legislation or regulation are integrated into the overall wilderness management. The goal is to minimize trammeling of natural environments and opportunities for solitude, and to satisfactorily re-establish those characteristics if they become trammeled beyond established acceptable levels of change.

PRESCRIPTION FOR MANAGEMENT AREA 8_e (Pristine Recreation Opportunity)

This prescription emphasizes the highest level of solitude, very few (rare) party encounters, very high opportunities for challenge, risk, self-reliance and initiative, very low level of on-site public safety (very high level of woodsmanship/mountaineering skills is assumed of visitor), and very low to no Forest Service administration/public contact. Travel is cross-country, utilizing natural travelways (game trails) or requiring a high degree of skill (mountaineering or orienteering). Management activities are integrated in such a way that evidence of current human use, including permitted and recreation livestock, is not noticeable the following season to the wilderness user, or so that natural biological processes are not adversely or artificially changed over time by human use.

PRESCRIPTION FOR MANAGEMENT AREA 8_f (Primitive Recreation Opportunities)

This prescription emphasizes high levels of solitude, few party encounters, high opportunities for challenge, risk, and self-reliance, low level of on-site public safety (high level of woodsmanship skills is assumed of visitor), and a low degree of Forest Service administration/public contact. Human travel is cross-country or by use of a low-density constructed trail system.

PRESCRIPTION FOR MANAGEMENT AREA 8_g (Semi-Primitive Recreation Opportunities)

This prescription emphasizes moderate levels of solitude, some party encounters, moderate opportunities for challenge, risk, and self-reliance, moderate level of on-site public safety (reasonable level of woodsmanship skills is assumed of visitor), and a moderate degree of Forest Service administration/public contact. Management activities are integrated in such a way that current human use leaves only limited and site-specific evidence of their passing. Unacceptable levels of past use are rehabilitated and the affected area restored. Human travel is principally on constructed arterial trails. Campsites are used and show evidence of repeated, but acceptable levels of use.

PRESCRIPTION FOR MANAGEMENT AREA 8_h (Transition Recreation Opportunities)

This prescription emphasizes low levels of solitude, many party encounters, low opportunities for challenge, risk, and self-reliance, high level of on-site public safety (low level of woodsmanship skills is assumed of visitor), and a high degree of Forest Service administration/public contact. Management activities are integrated in such a way that the bio-physical wilderness resources are protected from unacceptable change, and day-users are made aware of the purposes of wilderness management. Management is directed towards providing a generally natural appearing setting with very high densities of predominantly day-users. An arterial trail system directs the user within the area and leads the overnight user quickly through to other management areas. There are no developed sites. Facilities such as bridges, etc., necessary for user safety or bio-physical resource protection may be present.

PRESCRIPTION FOR MANAGEMENT AREA 8e (Pristine)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Management (A02)	Allow no development of cultural resources for recreational purposes. Allow use of identified cultural resource properties for religious, other socio/cultural or research purposes only when such use will not degrade wilderness values.	
Visual Resource Management (A03, A04)	Manage for maximum retention of the natural landscape. Design and locate management activities to meet the visual quality objective of "Preservation" in all areas except where specific surface occupancy is authorized by wilderness legislation. In these areas, the visual quality objective is "Retention."	
Dispersed Recreation (A14, A15)	Emphasize opportunities for primitive and unconfined recreation activities featuring solitude, the chance to experience unmodified natural ecosystems, and to travel cross-country in an environment where success or failure is directly dependent on ability, knowledge and initiative. Recreation management will involve regulation of use and a relatively high degree of control. Control use, party size, and number of recreational livestock to provide opportunities for isolation and solitude.	1. Limit group sizes to 15 persons, and recreation livestock to 23 head, with exceptions decided on a case-by-case basis by the District Ranger. Closely administer the itinerary of commercial outfitter guides and larger party size private groups to manage this area for desired high level of solitude. 2. Dogs will remain under voice or physical control at all times. 3. Recreation stock will be held outside of foreground of lakes, streams, and trails and grazing will be controlled to at least 200 yards from lake shorelines and 100 yards from primary trails. 4. Permit overnight camping on undesignated sites in Frissell condition classes one through three. Close and restore sites in Frissell condition classes four and five.

PRESCRIPTION FOR MANAGMENT AREA 8e (Pristine, continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
WILDERNESS		
Wilderness Research (B05)	Provide for research and education opportunities that are compatible with wilderness objectives and dependent on a wilderness environment. Give high priority to recreational use and human behavior as research projects.	
WILDLIFE	Permit fish and wildlife research and management according to the policy and guidelines adopted by the International Association of Fish and Wildlife Agencies. (FSM 2323.3).	
Non-structural and Structural Wildlife Habitat Improvement (C03, C06)	Allow the natural distribution and population of wildlife species indigenous to the area to maintain a natural balance with habitat, each other, and man. 1. Manage the designated river otter habitat along the Piedra River extending into the wilderness under the joint agreement with the Colorado Division of Wildlife. 2. Retain predatory animals as a viable component of the forest fauna.	
FISHERIES		
Non-structural Fish Habitat Improvement (C04, C07)	Allow aerial fish stocking only in waters previously stocked in that manner prior to establishment of the wilderness. 1. Determine species to be stocked based on historical stocking records. 2. Schedule stocking during low use periods whenever possible.	
RANGE		
Range Resource Management (D02)	Graze livestock with the intent to utilize available forage and maintain forage vigor. 1. Maintain range forage condition in a "good" or better condition with a stable or upward trend. Utilization standards will vary with grazing systems and range condition. Utilization objectives will be 20-30 percent for livestock. 2. Resolve specific conflicts (i.e., high country sheep grazing) through herding, riding, salting, and specific utilization objectives.	Prohibit pack and saddle stock at least 200 feet from lakes and streams except for watering and through-travel.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	3. Control noxious weeds and cooperate with other governmental agencies in control efforts.	
Range Forage Improvement (D03)	Do not use range cultural practices such as planting or vegetation manipulation to improve forage composition or production.	
Range Structural Improvements (D05) and Maintenance (D06)	Emphasize primitive, natural material for water developments and range structures. Implement revegetation only for rehabilitation of areas in less than "good" condition based upon their natural potential. Implement only where natural revegetation possibilities are poor, and only where degradation is due to human activities.	
TIMBER		
Timber Resource Management Planning and Inventories (E00)	Forest land is "unavailable" for timber harvest.	
WATER		
Water Resource Improvements (F05)	Maintain water quality or establish acceptable standards in cooperation with the State where management techniques may reduce existing water quality.	
MINERALS AND GEOLOGY		
Mining Law Compliance and Administration (G01)	Administer all mineral activities as required in 36 CFR, Parts 228 and 293, FSM 2300 and 2800, and Section 4(d)(2) and (3) of the Wilderness Act of 1964. The number of operation inspections will be commensurate with the potential for resource damage and/or the activity level of each operation.	
Minerals Management - Leasables	Recommend against or deny consent to BLM for leasing when any one or more of the following conditions occur: 1. Threatened and endangered wildlife essential habitat. 2. Threatened and endangered plant species.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	3. High resource sensitivity based on: a. Slopes steeper than 40 percent; b. High erosion hazard; c. High geologic hazard; d. Low visual absorption capacity. 4. Lands leasable under the above conditions, which would result in "islands" because access, etc., would be necessary across land which could not be restored as near as practical to natural conditions. An exception to the above is where the first three conditions occur within one-half mile of areas which can be leased with surface use or occupancy. For these situations, recommend for leasing subject to no surface use or occupancy. Forest Service (R-2) Supplement F to Form 3109-3, "Surface Use or Occupancy Stipulation," will apply to these areas. Recommend for or consent to issuance of leases allowing surface disturbance for areas on which none of the above situations occur. Include the following stipulations in all leases: 1. BLM Form 3109-3, "Stipulation For Lands Under Jurisdiction of Department of Agriculture." 2. Forest Service (R-2) Supplement D to Form 3109-3, "Surface Disturbance Stipulation." 3. Forest Service (R-2) Supplement R (for oil, gas and geothermal) or Supplement S (for other leasables) to Form 3109-3, "Wilderness Stipulations." Require Forest Service (R-2) Supplement G to Form 3109-3, "Activity Coordination Stipulation," when high levels of mineral activity are proposed in environmentally sensitive areas.	
LANDS		
Land Exchange and Acquisition (J13,J15)	Pursue acquisition of private lands within and adjacent to wilderness which threaten wilderness values and resources.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
Special Use Management (J01)	Permit existing facilities (presently allowed by regulations/ policies) to remain under special use management. Allow no new facilities except those authorized through provisions of the Wilderness Act. Remove existing non-conforming structures unless they are determined to be of cultural or historical value.	
SOILS	Maintain soils in a stable or upward trend. Rehabilitate disturbances caused by man to restore natural ecological processes. 1. Stabilize and rehabilitate man-caused disturbances. 2. Determine campsite condition for degradation. Close or rehabilitate sites in unacceptable conditions.	
FACILITIES		
Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Do not construct or maintain trails in this management area. Visitors are left to their own initiative and personal devices to travel in this area. 1. No bridge or ford construction. 2. No trailhead facilities associated with management areas. 3. No interior signing.	
PROTECTION		
Insect and Disease (P35,P39)	Allow forest disease and insect outbreaks to run a natural course, except controlled action will be taken where there is clear and eminent danger to resources on adjacent lands.	
Fire Suppression (P08, P09)	Perpetuate and maintain the ecosystems within the wilderness by the natural occurrence of fire.	1. Immediate suppression action will be taken on: a. All man-caused fires. b. Fires which threaten human lives, public and private property, or fires which threaten to escape from the wilderness to adjacent areas with more restrictive fire prescriptions.
Treatment of Activity and Natural Fuels (P11, P12)	1. Suppression action will be initiated on fires which threaten to create unacceptable levels of air pollution.	

PRESCRIPTION FOR MANAGMENT AREA 8e (Pristine, continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
		2. Suppression action will be taken on natural fires occurring in the Florida River Municipal Watershed Fire Management Unit to restrict fire size to less than 250 acres. If other municipal watersheds are identified, similar fire size limitations will be developed. 3. Natural (lightning-caused) fires occurring in the remainder of the wilderness will be managed under prescribed conditions. 4. The use of bulldozers or other motorized equipment must be approved by the Regional Forester and will be requested only when there is an eminent threat to human life, private property, or resources outside the wilderness.
VEGETATION AND DIVERSITY MANAGEMENT	Protect and maintain natural conditions and processes of plant communities. Allow natural processes to occur. Revegetate only where unacceptable disturbance has occurred due to human activities and natural revegetation possibilities are poor.	

PRESCRIPTION FOR MANAGEMENT AREA 8_f (Primitive)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Management (A02)	Same as Prescription 8_e	
Visual Resource Management (A03, A04)	Same as Prescription 8_e	
Dispersed Recreation (A14, A15)	Same as Prescription 8_e, except place less emphasis on isolation and solitude.	Same as Prescription 8_e
WILDERNESS	Same as Prescription 8_e	
WILDLIFE	Same as Prescription 8_e	
FISHERIES	Same as Prescription 8_e	
RANGE	Same as Prescription 8_e	Same as Prescription 8_e
TIMBER	Same as Prescription 8_e	
WATER	Maintain water quality or establish acceptable standards in cooperation with the State where management techniques may reduce existing water quality. Correct erosion sources in trail corridors.	
MINERALS AND GEOLOGY	Same as Prescription 8_e	
LANDS	Same as Prescription 8_e	
SOILS	Maintain soils in a stable or upward trend. Limit erosion sources in immediate trail corridors. Rehabilitate disturbances caused by man to restore natural ecological processes. 1. Stabilize and rehabilitate man-caused disturbances. 2. Determine campsite condition for degradation. Close or rehabilitate sites in unacceptable condition.	Correct trail erosion problems to standards established in R-2 Trail Standards Handbook (FSH 7709.12).

PRESCRIPTION FOR MANAGEMENT AREA 8_f (Primitive, continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
FACILITIES		
Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Construct only trails identified as absolute necessities. Maintain existing trails to provide a low level of on-site public safety. 1. Use native or natural materials in trail construction. Metal culverts will be phased out. 2. Bridges or constructed low water fords will not be allowed in the primitive area. 3. Locate few trailhead facilities associated with this management area outside the wilderness. Provide facilities commensurate with the use level associated with this management area (parking for one to five vehicles, very low signing, limited visitor information). 4. No interior signing.	Construct or maintain trails to maintenance level one. Maintain trails in accordance to standards in Trail Handbook (FSH 7709.12).
PROTECTION	Same as Prescription 8_e	
VEGETATION AND DIVERSITY MANAGEMENT	Same as Prescription 8_e	

PRESCRIPTION FOR MANAGEMENT AREA 8_g (Semi-Primitive)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Management (A02)	Same as Prescription 8_e	
Visual Resource Management (A03, A04)	Same as Prescription 8_e	
Dispersed Recreation (A14, A15)	Recreation management will involve regulation of use and a relatively high degree of control.	
	Control use, party size, and number of recreational livestock to provide opportunities for isolation and solitude.	1. Limit group sizes to 15 persons, and recreation livestock to 23 head, with exceptions decided on a case-by-case basis by the District Ranger. 2. Dogs will remain under voice or physical control at all times. 3. Recreation stock will be held outside of foreground of lakes, streams, and trails and grazing will be controlled to at least 200 yards from lake shorelines and 100 yards from primary trails.
	Provide overnight camping in areas located which would minimize use conflicts and resource damage. Control length of stay and camping methods to protect resources and provide a valued wilderness experience. A general prohibition in the zone will be: no campsites or campfires within 200 feet of lakeshores and 100 feet of primary trails. Specific closures will be on a case-by-case basis as posted and illustrated on maps.	1. Permit overnight camping on undesignated sites in Frissell condition classes one through three. Close and restore sites in Frissell condition classes four and five. 2. Specific closures within the Weminuche semi-primitive zone are: A. Emerald Lake 1. No camping or recreation stock grazing within one-quarter mile of shoreline on east side. 2. No camping or recreation stock grazing within one-half mile of shoreline on north side. B. Little Emerald Lake 1. No camping or recreation stock grazing within one-quarter mile of shoreline of the lake.

PRESCRIPTION FOR MANAGEMENT AREA 8_g (Semi-Primitive, continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
		3. Limit occupancy of campsites to five consecutive days. 4. Allow no camp improvements of a permanent nature. All camping improvements to be removed after use of site (five days maximum.)
WILDERNESS	Same as Prescription 8_e	
WILDLIFE	Same as Prescription 8_e	
FISHERIES	Same as Prescription 8_e	
RANGE	Same as Prescription 8_e	Same as Prescription 8_e except allow range permittee motorized access to Lizard Head Wilderness, into Alexander Pond and Ditch. Sec. 15, 22, T42N, R10W.
TIMBER	Same as Prescription 8_e	
WATER	Same as Prescription 8_f	
MINERALS AND GEOLOGY	Same as Prescription 8_e	
LANDS		
Land Exchange and Acquisition (J13, J15)	Same as Prescription 8_e	Granite Peak Guard Station (FS) and Raber Ditch Cabin (Colo. Div. of Wild.) will remain within the Weminuche Wilderness for administrative and historical use.
SOILS	Same as Prescription 8_f	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
FACILITIES		
Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Construct and maintain trails and bridges to facilitate distribution of users and to provide a moderate level of on-site public safety. 1. Use native or natural materials in trail and bridge construction. Metal culverts will be phased out. 2. Provide bridges only to protect health and safety of the wilderness user. 3. Locate trailhead facilities outside the wilderness. Provide facilities commensurate with the use level associated with this management area (parking for five to ten vehicles, minimal signing, moderate visitor information). 4. Provide and maintain signs for public safety as follows: a. Use standard Forest Service trailways, trail posts, and rock cairns. Signs are to be natural appearing wood with routed letters. b. All trail junctions and trailheads will be signed without destination distances indicated. Phase out existing non-conforming signs.	Construct and maintain trails to a level two. Maintain trails in accordance to standards in Trail Handbook (FSH 7709.12).
PROTECTION	Same as Prescription 8_e	Same as Prescription 8_e
VEGETATION AND DIVERSITY MANAGEMENT	Same as Prescription 8_e	

PRESCRIPTION FOR MANAGEMENT AREA 8_h (Transition)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Management (A02)	Same as Prescription 8_e	
Visual Resource Management (A03, A04)	Same as Prescription 8_e	
Dispersed Recreation (A14, A15)	Recreation management will involve regulation of use and a high degree of control.	
	Control use, party size, and number of recreational livestock to provide opportunities for isolation and solitude.	1. Limit group sizes to 15 persons, and recreation livestock to 23 head, with exceptions decided on a case-by case basis by the District Ranger. 2. Allow recreation stock only to pass through this management area. 3. Dogs will remain under voice or physical control. 4. Prohibit outfitter-guide operations, except for through-travel.
	Control camping to protect resources and provide a valued wilderness experience. Provide information about the wilderness concept, minimum impact methods, restriction, alternative areas available, proper stock use, etc.	1. Allow no camping. Close and restore campsites in Frissell condition classes four and five.
WILDERNESS	Same as Prescription 8_e	
WILDLIFE	Same as Prescription 8_e	
FISHERIES	Same as Prescription 8_e	
RANGE	Same as Prescription 8_e	Same as Prescription 8_e
TIMBER	Same as Prescription 8_e	
WATER	Same as Prescription 8_f	

PRESCRIPTION FOR MANAGEMENT AREA 8_h (Transition, continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
MINERALS AND GEOLOGY	Same as Prescription 8_e	
LANDS	Same as Prescription 8_e	
SOILS	Same as Prescription 8_f	
FACILITIES		
Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Construct and maintain trails and bridges to facilitate distribution of users and to provide high level of on-site public safety. 1. Use native or natural materials in trail construction. Metal culverts will be phased out. 2. Provide bridges only where foot and horse use cannot safely cross and to protect soil and water resources. Use rustic construction. 3. Locate trailhead facilities outside the Wilderness. Provide facilities commensurate with the use level associated with this management area (parking for 10-40 vehicles). 4. Provide and maintain signs for public safety as follows: a. Use standard Forest Service trailways, trail posts, and rock cairns. Signs are to be natural appearing wood with routed letters. b. All trail junctions and trailheads will be signed without destination distances indicated. Phase out existing non-conforming signs.	Construct and maintain trails to a level three. Maintain trails in accordance to standards in Trail Handbook (FSH 7709.12).
PROTECTION	Same as Prescription 8_e	
VEGETATION AND DIVERSITY MANAGEMENT	Same as Prescription 8_e	

PRESCRIPTION FOR MANAGEMENT AREA L$_1$

This prescription is designed to protect and preserve the prehistoric ruins and peregrine falcon habitat located within Chimney Rock Archaeological Area. Limited public use of Chimney Rock Archaeological Area will be allowed.

Access will be restricted to the delineated area as necessary to protect the concentrated ruins and peregrine falcon eyrie. Close coordination will be maintained with the Southern Ute Tribe and the Colorado Division of Wildlife. Other resource and land management activities will be severely constrained to avoid conflict with protection and preservation objectives. Investments for resources other than cultural or wildlife will normally not be made.

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Management (A02)	Manage cultural resources for protection, preservation, investigation, and limited public use. 1. Maintain reconstructed ruins to present standards with no significant activities that would require additional excavation or reconstruction. 2. Allow public visitation to occur on a limited basis; restrict to guided trips only during periods that do not adversely affect the peregrine falcon or damage archaeological resources. 3. Issue antiquities permits compatible with area objectives to qualified academic institutions, individuals, and other organizations for study and research. 4. Inform the public about the cultural resources found in the area. 5. Curate artifacts found in the area if they are too significant to risk loss by leaving them on site.	
Visual Resource Management (A03, A04)	Meet the visual quality objective of "Retention" as a minimum for all activities.	
Recreation or VIS Site Construction and Rehabilitation (A05,A06) Visitor Information Services (A08,A09) Dispersed Recreation (A14, A15)	Limit recreation development to that necessary for sanitation, resource protection, and interpretative purposes. 1. Do not construct new developments for public convenience. Allow improvements to existing facilities and construction of sanitary facilities only. 2. Close the area to all types of general public recreation use except interpretive/naturalist guided tours.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	3. Develop no overnight or day use facilities on or adjacent to the area.	
Recreation Management (A16)	Permit only special land uses directly serving public visitation and interpretation of the ruins.	
WILDLIFE		
Non-structural and Structural Wildlife Habitat Improvement (C03, C06)	Manage for peregrine falcon. 1. Undertake population reduction programs for any species of wildlife that increases in number to a point of being detrimental to the peregrine falcon habitat. 2. Cooperate with State officials in establishing and enforcing "no hunting and trapping" policies. 3. Undertake projects to improve habitat of small songbirds to increase their numbers as prey for the peregrine falcon. 4. Cooperate with the Colorado Division of Wildlife under the Memorandum of Understanding #130051 to maintain the peregrine falcon and improve its habitat at the Chimney Rock site. 5. Minimize impact to the peregrine falcon eyrie by conducting guided visitor tours so that they least conflict with Falcon nesting and rearing periods.	
RANGE		
Range Resource Planning and Inventory (D01)	Permit no livestock grazing except the use and grazing of recreation horses.	
TIMBER		
Timber Resource Management Planning and Inventories (E00)	Allow tree removal only when removal enhances cultural or wildlife resource values or improves safety. Capable forest land is not suitable for timber production and is placed in the "reserved" component.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	Fell trees only for such purposes as public safety, improvement of aesthetics, insect and disease control, ruins research and maintenance, ruins reconstruction, or wildlife habitat improvement.	
WATER	See Forest-wide Management Requirements.	
MINERALS AND GEOLOGY		
Mining Law Compliance and Administration (G01)	Maintain current withdrawal from mineral entry on the 1,350 acres centered on the Chimney Rock cuesta (withdrawn 4/30/70 under authority of E.O. 10355). Pursue withdrawal of the remaining 1,810 acres of the designated Chimney Rock Archaeological Area. In the event that withdrawal is not made, supervise activities of claimants to insure minimum impact on cultural and wildlife resources.	
Minerals Management - Leasables	Recommend against or deny consent to BLM for issuance of leases or portions of leases within areas to which this prescription applies. An exception to the above is where surface use or occupancy can be permitted immediately adjacent to the boundary of the area to which this prescription applies. For these situations, recommend for leasing the area within one-half mile inside the boundary subject to no surface use or occupancy. Forest Service (R-2) Supplement F to Form 3109-3, "Surface Use or Occupancy Stipulation," will apply to those areas. Include standard stipulations (BLM Form 3109-3, "Stipulation For Lands Under Jurisdiction of Department of Agriculture" and Forest Service (R-2) Supplement D to Form 3109-3, "Surface Disturbance Stipulation") in all leases.	
LANDS		
Special Use Management (J01)	Permit only special land uses directly serving public visitation and interpretation of the ruins.	
Property Boundary Location (J06)	Survey, mark and post the boundary of the Chimney Rock Archaeological Area.	
Land Exchange and Acquisition (J13,J15)	Actively pursue acquisition of adjacent or nearby lands essential for protection of significant archaeological values.	

PRESCRIPTION FOR MANAGEMENT AREA L_1 (Continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
SOILS	See Forest-wide Management Requirements.	
FACILITIES		
Local Road Construction, Reconstruction, and Maintenance (L12, L13, L19) Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Develop transportation system only to enhance interpretive or maintenance opportunities. 1. Close the Chimney Rock Archaeological Area to all motorized vehicles except those used for maintenance, emergenices, administration, and guided tours, or those authorized by the San Juan National Forest Supervisor. 2. Construct no new roads. 3. Construct short interpretive trails for guided tours.	
PROTECTION		
Fire Suppression (P08, P09) Treatment of Activity and Natural Fuels (P11, P12) Law Enforcement (P24) Insect and Disease Management-Suppression (P35)	Assure the protection of cultural, recreational, wildlife, and visual values. Protect the area from disease, insect, and fire outbreaks that threaten the integrity of the site. 1. Permit the use of dozers in fire suppression only after consultation with an archaeologist. 2. Prescribe burn for hazard reduction when archaeological, wildlife, and recreational resources are not endangered. 3. Closely monitor ruins for deterioration and law violations. 4. Suppress all fires posing danger to the archaeological ruins or the peregrine falcon habitat.	Take suppression actions necessary to control wildfires at ten acres or less on 90 percent of the days during the regular fire season.
VEGETATION MANAGEMENT AND DIVERSITY	No specific vegetation management is planned except as necessary for insect and disease control, or to meet cultural, wildlife, or safety objectives.	

PRESCRIPTIONS FOR MANAGEMENT AREAS P_1 AND P_2

These prescriptions are designed to achieve high water production on suitable lands. This summary section discusses both prescriptions to point out similarities and differences. The summary is followed by management requirements (General Direction and Standards and Guidelines) for each of the prescriptions.

Emphasis is upon management practices that increase water yield, while managing for a mix of other resources. Timber cutting and reforestation practices will be modified to enhance water runoff. Wildlife will not be emphasized, although for some species habitat will be enhanced and numbers will increase. Investment for roads will be moderate and road maintenance will be low. Prescription P_1 will apply to lands determined suitable for timber production. Prescription P_2 will apply to lands determined unsuitable for timber production because of economics or technology unavailable for timber operations.

PRESCRIPTION FOR MANAGEMENT AREA P_1

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
RECREATION		
Cultural Resource Inventories, Evaluation, Protection (A02; 306, 307, 308)	See Forest-wide Management Requirements.	
Cultural Resource Enhancement (A02; 309)	Allow recreation and non-recreation use of suitable cultural resource properties to the extent that such uses do not conflict with other resource uses. Limit interpretation to low cost developments such as interpretive signing.	
Visual Resource Management (A03, A04)	Meet the visual quality objective of "Maximum Modification" as a minimum for all activities.	
Dispersed Recreation (A14, A15)	Manage the recreation resource in these areas to provide "Roaded Natural Appearing" recreation opportunities with emphasis on dispersed use. 1. Permit non-motorized recreation activities yearlong throughout the area. (Refer to management activities under "facilities" for additional direction relating to roads and trails.)	
WILDLIFE		
Non-structural and Structural Wildlife Habitat Improvement (C03, C06)	Limit investments in wildlife habitat projects to those that do not cause immediate or long-term reductions in water quantity. Favor indicator species through timber management activities where possible.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	Deer, Elk, and Bear: 1. Regenerate aspen clones in small scattered sites where they can be protected from livestock grazing by plantation protection fences. 2. Partially maintain vegetation diversity by maintaining present aspen percentage. 3. Schedule silvicultural activities so that calving and fawning areas are not unduly disrupted during the last two weeks of May and the first two weeks of June.	Goshawk: Prohibit management activities within 300 feet of any occupied raptor nest during the period of May 1 through July 31. Hairy Woodpecker, Mountain Bluebird: Retain 20 snags per 10 acres in all forested types. See the Vegetation Management and Diversity Section at the end of this prescription for additional standards and guidelines.
RANGE		
Range Resource Management (D02)	Manage livestock under low intensity to utilize available forage and maintain forage vigor. 1. Construct and maintain trails and travel routes. 2. Manage livestock through activities such as herding, riding, salting, and livestock pest control. 3. Use simple management systems (e.g., season-long grazing) unless improved management systems, (e.g., rest-rotation, deferred-rotation) can be instituted by using pasture fences already in place or by constructing drift fences as described below. 4. Maintain predatory animals as a viable part of the fauna. Control only problem predatory animals as needed to prevent undue predation on other wildlife or domestic livestock. Limit control to non-chemical means and restrict control in human use areas.	Utilize 20 percent of usable forage production for livestock in non-regenerating areas. Reduce utilization by 50 percent in plantations and naturally regenerating stands.
Range Forage Improvement (D03)	Do not use range cultural practices such as planting or vegetation manipulation to improve livestock forage production.	
Range Structural Improvements (D05) and Maintenance (D06)	Construct and maintain allotment boundary fences, drift fences (normally less than one-half mile in length) and water developments necessary to implement simple management systems.	

PRESCRIPTION FOR MANAGEMENT AREA P_1 (Continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
TIMBER		
Timber Resource Management Planning and Inventories (E00)	Manage vegetation types to achieve a high water resource yield while maintaining a moderate timber resource yield.	See the Vegetation Management and Diversity Section at the end of this prescription for standards and guidelines.
WATER		
Water Resource Improvement (F05)	Increase water yield in forested areas through vegetation manipulation. In non-forested areas, use snow-pack management techniques.	1. Use snow fencing in the upper one-third of open slopes (generally high montane meadows or alpine) where snow deposition will occur in protected areas. Structures should be constructed with: a. Ridge crest locations with the deep part of the resultant snow drift not more than eight to ten times the height of the structure. b. Perpendicular orientation to prevailing winds. c. At least 500 feet of upwind contributing area with little natural snow accumulation and upslope or level terrain. d. Northerly to northeasterly exposure of resultant snow drift. See the Vegetation Management and Diversity Section at the end of this prescription for additional standards and guidelines.
MINERALS AND GEOLOGY		
Mining Law Compliance and Administration (G01)	See Forest-wide Management Requirements.	
Minerals Management - Leasables	Recommend against or deny consent to BLM for leasing when any one or more of the following conditions occur: 1. Threatened and endangered wildlife essential habitat. 2. Threatened and endangered plant species.	

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
	3. High resource sensitivity based on: a. Slopes steeper than 60 percent; b. High erosion hazard; c. High geologic hazard. An exception to the above is where the conditions occur within one-half mile of areas which can be leased with surface use or occupancy. For these situations, recommend for leasing subject to no surface use or occupancy. Forest Service (R-2) Supplement F to Form 3109-3, "Surface Use or Occupancy Stipulation," will apply to these areas. Recommend for or consent to issuance of leases allowing surface disturbance for areas on which none of the above situations occur. Include standard stipulations (BLM Form 3109-3, "Stipulation For Lands Under Jurisdiction of Department of Agriculture" and Forest Service (R-2) Supplement D to Form 3109-3, "Surface Disturbance Stipulation") in all leases.	
LANDS	See Forest-wide Management Requirements.	
SOILS	See Forest-wide Management Requirements.	
FACILITIES		
Local Road Construction, Reconstruction, and Maintenance (L12, L13, L19) Trail Construction/ Reconstruction and Trail System Management (L22, L23)	Construct and maintain roads and trails to the minimum standards required for the timber management activities that accomplish the water yield objectives. 1. Allow motorized travel off development roads and trails. 2. Manage local constant roads to accommodate medium-light, seasonal use (SADT 10-50). Regulate seasonal public use if roadbed damage will occur. 3. Manage local intermittent roads to accommodate light use (SADT 0-20). Close to public use.	1. Construct or reconstruct local constant roads with gravel support needed for timber operations and hauling. Maintain to maintenance level three. 2. Construct local intermittent roads with no gravel support unless needed to extend logging seasons. Maintain to maintenance level two when open for project activities. 3. Maintain trails to a maintenance level two. 4. Manage the area for a high density (two to four miles/square mile) of system roads.

PRESCRIPTION FOR MANAGEMENT AREA P_1 (Continued)

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS AND GUIDELINES
PROTECTION	See Forest-wide Management Requirements.	See the Vegetation Management and Diversity Section at the end of this prescription for prescribed fire standards and guidelines.
VEGETATION MANAGEMENT AND DIVERSITY		See the following chart for standards and guidelines for managing vegetation for all resource activities. Use the specified regeneration silvicultural practices for the respective species at least 80 percent of the time. Specific site characteristics may require some other regeneration silvicultural practice in some areas.

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT: Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	UNDERSTORY MANAGEMENT
Ponderosa pine	All	All	This prescription is not applicable for this vegetation type. For small inclusions, treat with surrounding area using accepted cutting systems for this type.					
Aspen	All	All	Manage 100% of this type for increased water yield and timber production. Wildlife management indicator species that would be benefiting are; deer, elk and hairy woodpecker.	Clearcut 20% of this type within the watershed in units of 5-25 acres at 15 year intervals. Thus, the entire type within the watershed will be clearcut in 75 years or a 75 year rotation. Clearcut entire clones.	None	None	Natural regeneration without site preparation.	None
Interior Douglas-fir	All	All	Same as above.	Clearcut 20% of the type within a watershed on 5-10 acre units. The clearcuts should be should be concentrated on lower to mid-slope positions in lower energy aspects (N,NE, NW). The clearcuts should be 5-7 tree heights in width. When the regeneration is 6' tall (40 years), clearcut an additional 20% of the type within the watershed. Thus, the entire type within the watershed will be clearcut in 200 years or a 200-year rotation.	None	None	Burn logging debris. Natural regeneration.	None
Engelmann Spruce-Subalpine fir	All	All	See interior Douglas-fir. Everything is the same except plant 840 trees/acre.					

PRESCRIPTION FOR MANAGEMENT AREA P_1 (Continued)

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT				UNDERSTORY MANAGEMENT
				Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	
Pinon pine juniper	All	N/A	This prescription is not applicable for this vegetation type. If small inclusions do occur, no diversity objectives are planned for. Natural sucession will take place.					
Gambel oak	All	N/A	Same as above.					
Mixed browse	All	N/A	Same as above.					
Grassland	All	N/A	Same as above.					

PRESCRIPTION FOR MANAGEMENT AREA P_2

MANAGEMENT ACTIVITIES	GENERAL DIRECTION	STANDARDS, AND GUIDELINES
RECREATION	Same as Prescription P_1	
WILDLIFE	Same as Prescription P_1	Same as Prescription P_1
RANGE	Same as Prescription P_1, except allow normal utilization in timber harvest areas.	
TIMBER	The area under this prescription is unsuitable for timber management.	
WATER	Same as Prescription P_1	Same as Prescription P_1
MINERALS AND GEOLOGY	Same as Prescription P_1	
LANDS	Same as Prescription P_1	
SOILS	Same as Prescription P_1	
FACILITIES		
Local Road Construction, Reconstruction, and Maintenance (L12, L13, L19)	Construct and maintain roads and trails to the minimum standards required for activities that accomplish water yield objectives.	Same as Prescription P_1, except construct all roads with no gravel support and manage the area for a low density (zero to one mile/square mile) of system roads.
Trail Construction/ Reconstruction and Trail System Management (L22, L23)		
PROTECTION	Same as Prescription P_1	See the Vegetation Management and Diversity Section at the end of this prescription for prescribed fire standards and guidelines.
VEGETATION MANAGEMENT AND DIVERSITY	Manage vegetation types to achieve a high water yield. Site specific diversity objectives may not be achieved.	See the following chart for standards and guidelines for managing vegetation for all resource objectives.

PRESCRIPTION FOR MANAGEMENT AREA P_2 (Continued)

Vegetation Management And Diversity Chart

SPECIES OR VEGETATION	SLOPE CLASS	EXISTING BASAL AREA OR STOCKING	MANAGEMENT OBJECTIVES	OVERSTORY MANAGEMENT				UNDERSTORY MANAGEMENT
				Harvest Method	Intermediate Cuts	Other Timber Stand Improvement	Regeneration	
Ponderosa pine	All	All	Same as Prescription P_1.					
Aspen	All	All	Manage 100% of area for increased water yield.	Clearcut noncommercially 20% of the type within the watershed in units of 5-25 acres at 15-year intervals. Clearcut entire clones.	None	None	Natural regeneration is expected to occur.	None
Interior Douglas-fir	All	All	Manage 100% of area for increased water yield. Make no effort to regenerate the clearcuts.	Clearcut noncommercially and burn slash, 20% of the type within a watershed on 5-10 acre units. The clearcuts should be 5-7 tree heights in width.	None	None	None	Treat clearcut areas by burning every 20 years to keep in equivalent clearcut condition.
Engelmann Spruce-Subalpine fir	All	All	Same as above, interior Douglas-fir.					
Pinon pine juniper	All	N/A	Same as Prescription P_1.					
Gambel oak	All	N/A	Same as Prescription P_1.					
Mixed browse	All	N/A	Same as Prescription P_1.					
Grassland	All	N/A	Same as Prescription P_1.					

APPENDIX E

SAN JUAN RESOURCE ALLOCATION MODEL

SAN JUAN RESOURCE ALLOCATION MODEL

The resource allocation model used in developing the San Juan National Forest Plan is called FORPLAN. FORPLAN is a linear programming model that was used to allocate and track acres managed under various prescriptions through time. Variables that are accounted for by the model include resource outputs, costs, and period of implementation.

The major components of the model are as follows:

Scheduled Outputs: Scheduled outputs are those whose levels are a function of the prescription chosen and the period of implementation. Scheduled outputs and the units in the San Juan FORPLAN model are as follows:

Timber Production - Cubic Feet
Livestock forage production - Animal Unit Months
Wildlife forage production - Animal Unit Months
Road construction - Miles
Road reconstruction - Miles
Road obliteration - Miles
Road maintenance - Miles
Roaded natural appearing area - Acres
Semi-primitive motorized area - Acres
Semi-primitive non-motorized area - Acres

There are additional outputs from the Forest which were not included in the FORPLAN model yet which were included in the economic efficiency analysis of the alternatives. These are as follows:

Developed Recreation - Private - Visitor Days
Developed Recreation - Public - Visitor Days
Wilderness Use - Visitor Days
Big Game Hunting - Visitor Days
Small Game Hunting - Visitor Days
Fishing - Visitor Days
Non-game Use - Visitor Days
Dispersed Recreation - Visitor Days
Improved Water Yield - Acre-Feet

MTVEST, a computer program for evaluating Forest investment opportunities, was used to incorporate all non-FORPLAN benefits and costs into a Forest-wide economic efficiency analysis.

Analysis Areas: Analysis areas are aggregations of acres, not necessarily contiguous, which are similar with respect to existing road density, vegetation, slope, timber size class, stand basal area, and legal/administrative status. Special areas such as wilderness, research natural areas, archaeological areas, and developed sites were not included as analysis areas in the model. Instead, outputs and costs were calculated for these areas outside the model; only areas for which allocation decisions had not been made were included in the linear program. One hundred and eighty-nine analysis areas were identified in the model.

Management Prescriptions: Management prescriptions are sets of coordinated management practices applied to specific analysis areas. Prescriptions were quantified in terms of outputs and costs for modeling purposes, and the results of this quantification are called coefficients. There are approximately 1,400 prescriptions in the model.

Coefficients fall into one of two categories: output or economic coefficients. Output coefficients reflect the number of units per acre that can be produced over a specific period of time. These were estimated by resource specialists, using simulation models or other data sources. Economic coefficients are either cost or benefit values. Cost coefficients were estimated using historical Forest budgetary data, whereas benefit values used in the model were calculated for the Forest as a result of the Regional planning effort.

Planning Horizon: The planning horizon for the Forest-wide allocation model is 200 years, although only the timber resource was tracked for that length of time. All other outputs, as well as all dollar costs and benefits were tracked for a period of 50 years.

Constraints: Constraints are quantifiable limits placed on the model to ensure that only reasonable amounts of acres and dollars are used and that only reasonable amounts of outputs are produced. The following types of constraints were used in FORPLAN during the formulation and evaluation of alternatives:

-output constraints
-budget constraints
-timber flow constraints (e.g., non-declining yield)
-restocking of non-stocked land constraints
-prescription constraints
-inventory constraints

(See Appendix N for a more detailed discussion of the specific constraints used in the formulation and evaluation of alternatives.)

Objective Function: Objective functions are mathematical expressions of the criteria by which the model allocates resources to various prescriptions. These can be either economic (e.g., maximize present net value for five decades) or physical (e.g., maximize timber production in the first decade). During the evaluation of alternatives, all runs of the model were made using an objective function to maximize present net value over five decades.

More detailed information on how the model was developed and integrated into the model is available for review at the Forest Supervisor's Office in Durango.

Benefit Values: The following benefit values were used in the analysis of economic efficiency of the alternatives. These values result from the 1980 RPA and Regional Plan efforts. Timber values represent average bid prices, and were calculated from timber sale data on the Forest from 1972 through 1977. All values are in terms of 1978 dollars.

Water	$19.70/Acre-Foot
Range	$ 8.85/Animal Unit Month
Developed Recreation Use - Private	$ 3.75/Recreation Visitor Day
Developed Recreation Use - Public	$ 3.00/Recreation Visitor Day
Dispersed Recreation Use	$ 3.00/Recreation Visitor Day
Wilderness Use	$ 8.00/Recreation Visitor Day
Big Game Hunting	$25.20/Recreation Visitor Day
Small Game Hnting	$32.00/Recreation Visitor Day
Fishing Use	$15.75/Recreation Visitor Day
Non-game Use	$29.00/Recreation Visitor Day
Timber	
Ponderosa pine	$39.66/Thousand Board Feet
Aspen	$ 3.24/Thousand Board Feet
Spruce-fir	$28.10/Thousand Board Feet
Douglas-fir	$23.87/Thousand Board Feet

APPENDIX F

RESULTS OF DEPARTURES FROM BASE SALE SCHEDULE

RESULTS OF DEPARTURES FROM BASE SALE SCHEDULE

The following table displays the results of analyzing departures from the base sale schedule of each of the alternatives considered in detail. Timber outputs for the first 20 decades are shown for each alternative and the departure that is associated with it. Long-term sustained yield capacities are also shown.

Departures were run using FORPLAN with an objective function of maximizing present net value for five decades. Departures had the same budget and livestock forage constraints as the associated alternative, as well as the same range of management prescriptions. Only the timing of these prescriptions was allowed to vary in the departure. The timber constraint in the first decade was the same in the departure as in the associated alternative, although there were no Forest-wide timber constraints in subsequent decades of the departure runs. Harvest flow constraints in the departure alternative limited timber yield in any given decade to, at most, a 50 percent deviation (higher or lower) from the yield of the previous decade. The long-term sustained yield capacity from each alternative considered in detail was also constrained to be achieved in the departure.

Results of Departures From Base Sale Schedule

Timber Yield (MMCF/Period)	Alt. A	Dep. A	Alt. B	Dep. B	Alt. C	Dep. C	Alt. D	Dep. D	Alt. E	Dep. E	Alt. F	Dep. F	Alt. G	Dep. G	Alt. H	Dep. H
Period 1	65.0	69.6	182.0	181.8	85.0	85.0	52.3	52.9	81.5	202.8	88.0	88.0	100.0	109.0	100.0	100.0
2	65.0	37.1	182.0	225.3	85.0	85.0	82.3	79.3	85.0	101.4	97.0	63.6	100.0	55.4	105.0	53.2
3	65.0	50.5	182.0	210.3	85.0	85.0	86.2	89.3	87.5	50.7	105.0	95.4	100.0	83.0	110.0	79.8
4	65.0	75.7	182.0	113.8	85.0	91.6	90.0	70.5	87.5	75.5	112.0	143.1	100.0	124.6	115.0	119.7
5	88.0	113.5	182.0	170.6	93.0	137.4	103.4	105.7	100.0	113.2	180.7	214.6	113.9	129.3	153.0	179.5
6	88.0	77.5	201.8	256.0	93.0	94.3	162.2	158.6	122.0	147.5	193.8	321.9	140.2	194.0	153.0	115.1
7	88.0	116.3	201.8	251.6	93.0	128.8	162.2	238.0	122.0	142.8	193.8	199.0	140.2	209.5	153.0	172.7
8	88.0	77.1	201.8	125.8	93.0	64.4	162.2	132.4	122.0	103.5	193.8	298.5	140.2	104.8	153.0	219.7
9	88.0	47.9	201.8	188.8	93.0	96.6	162.2	198.5	122.0	155.2	193.8	149.2	140.2	110.3	153.0	109.8
10	88.0	43.9	201.8	283.0	93.0	54.6	162.2	297.8	122.0	77.6	193.8	123.4	140.2	165.4	153.0	116.5
11	88.0	64.0	201.8	141.5	93.0	81.8	162.2	148.9	122.0	49.5	193.8	185.2	140.2	82.7	153.0	58.3
12	88.0	96.0	201.8	154.7	93.0	47.8	162.2	74.5	122.0	74.2	193.8	92.6	140.2	124.0	153.0	87.4
13	88.0	143.4	201.8	186.0	93.0	71.6	162.2	111.7	122.0	45.5	193.8	138.9	140.2	186.1	153.0	131.1
14	88.0	72.0	201.8	279.0	93.0	105.7	162.2	167.5	122.0	68.3	193.8	208.3	140.2	279.2	153.0	196.6
15	88.0	108.0	201.8	161.1	93.0	158.6	162.2	251.3	122.0	102.4	193.8	312.4	140.2	139.6	153.0	98.3
16	88.0	65.1	201.8	155.3	93.0	79.3	162.2	125.6	122.0	153.6	193.8	156.2	140.2	94.1	153.0	147.5
17	88.0	97.6	201.8	202.4	93.0	77.1	162.2	78.5	122.0	230.4	193.8	234.3	140.2	141.2	153.0	221.2
18	88.0	48.8	202.1	303.6	93.0	115.7	162.2	117.8	156.6	115.2	193.8	117.2	140.2	75.0	153.0	110.6
19	88.0	73.2	202.1	455.3	93.0	173.5	162.2	176.7	156.6	172.8	193.8	58.6	140.2	112.4	153.0	55.3
20	88.0	108.4	202.1	274.4	100.6	86.6	162.2	84.0	156.6	258.5	193.8	29.3	140.2	167.7	153.0	82.0
Long-Term Sustained Yield Capacity	118.7	118.7	283.5	283.5	131.3	131.3	209.8	209.8	171.8	171.8	261.7	261.7	198.8	198.8	190.4	190.4

APPENDIX G

ECONOMIC AND CONSTRAINT ANALYSIS OF ALTERNATIVES CONSIDERED IN DETAIL

ECONOMIC AND CONSTRAINT ANALYSIS OF ALTERNATIVES CONSIDERED IN DETAIL

As part of a sensitivity analysis, the cost-efficiency of the eight alternatives was calculated using two different discount rates. All figures shown in the body of this document are based on a four percent discount rate. Figures shown in this appendix are based on discount rates of both 4 percent and 7-1/8 percent.

Tables 1 and 2 display the results of cost-efficiency analyses of the alternatives based on a 4 percent and a 7-1/8 percent discount rate respectively. Tables 3 and 4 display the results of trade-off analyses from maximum present net value which is represented by Benchmark #3. (Benchmark alternatives are described in Chapter II.) Table 3 is based on a four percent discount rate and Table 4 is based on a 7-1/8 percent discount rate. In these last two tables, alternatives are listed in order of increasing opportunity costs, which are being defined as the net discounted benefits foregone as a result of binding constraints. Tables 5 and 6 display the constraints that were imposed on each alternative considered in detail. Table 5 describes those constraints that were common to all alternatives and Table 6 describes constraints specific to each alternative. Each of these tables shows those constraints which were binding.

The results indicate that the order of the alternatives in terms of increasing opportunity costs is, for the most part, insensitive to changing discount rates. Only Alternatives B and C changed positions when the discount rate was increased to 7-1/8 percent. This can be attributed to the large capital investment required to produce the commodity outputs under Alternative B. With a higher discount rate these large capital outlays in early time periods appear even less attractive, resulting in this alternative shifting from the position of the sixth highest opportunity cost to the seventh. For other alternatives, the higher discount rate is not sufficient to cause changes in the relative order of their opportunity costs.

TABLE 1

Cost-Efficiency Analysis of Alternatives Considered in Detail Based on a Discount Rate of Four Percent. (All figures except benefit-cost ratios are in millions of 1978 dollars)

	Benchmark #3	Alternatives A	B	C	D	E	F	G	H
Discounted Benefits									
Total Benefits	1674.8	1596.1	1699.1	1624.5	1654.6	1675.8	1647.6	1682.2	1701.6
Minimum Level Benefits	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3	1232.3
Incremental Benefits	442.5	363.8	466.8	392.2	422.3	443.5	415.3	449.9	469.3
Discounted Costs									
Total Costs	116.8	150.4	205.6	144.5	117.3	166.0	152.8	136.6	155.3
Minimum Level Costs	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
Incremental Costs	108.5	142.1	197.3	136.2	109.0	157.7	144.5	128.3	147.0
Incremental Present Net Value	334.0	221.7	269.5	256.0	313.0	285.8	270.8	321.6	322.3
Incremental Benefit-Cost Ratio	4.08	2.56	2.37	2.88	3.87	2.81	2.87	3.51	3.19

TABLE 2

Cost-efficiency Analysis of Alternatives Considered in Detail Based on a 7-1/8 Percent Discount Rate. (All figures except benefit-cost ratios are in millions of 1978 dollars.)

	Benchmark #3	A	B	C	D	E	F	G	H
Discounted Benefits									
Total Benefits	1039.5	998.8	1048.0	1011.0	1025.5	1038.6	1023.4	1042.9	1058.0
Minimum Level Benefits	788.4	788.4	788.4	788.4	788.4	788.4	788.4	788.4	788.4
Incremental Benefits	251.1	210.4	259.6	222.6	237.1	250.2	235.0	254.5	269.6
Discounted Costs									
Total Costs	78.3	100.5	137.5	96.9	78.5	116.5	101.6	93.0	103.4
Minimum Level Costs	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4
Incremental Costs	72.9	95.1	132.1	91.5	73.1	111.1	96.2	86.6	98.0
Incremental Present Net Value	178.2	115.3	127.5	131.1	164.0	139.1	138.8	167.9	171.6
Incremental Benefit Cost Ratio	3.44	2.21	1.97	2.43	3.24	2.25	2.44	2.94	2.75

TABLE 3

Trade-off Analysis from Maximum Present Net Value (Benchmark #3) Based on Four Percent Discount Rate. Alternatives are Listed in Order of Increasing Opportunity Cost from Benchmark #3. (All figures are in millions of 1978 dollars.)

	Benchmark #2	Benchmark #3	Alternatives H	G	D	E	F	B	C	A
Incremental Present Net Value	28.4	334.0	322.3	321.6	313.0	285.8	270.8	269.5	256.0	221.7
Difference in Present Net Value from Benchmark #3 (Opportunity Cost)	--	--	11.7	12.4	21.0	48.2	63.2	64.5	78.0	112.3
Difference in Benefits from Benchmark #3	--	--	26.8	7.4	-20.2	1.0	-27.2	24.3	-50.3	-78.7
Difference in Costs from Benchmark #3	--	--	38.5	19.8	0.5	49.2	36.0	88.8	27.7	33.6

TABLE 4

Trade-off Analysis from Maximum Present Net Value (Benchmark #3) Based on a 7-1/8 Percent Discount Rate. Alternatives Listed in Order of Increasing Opportunity Cost from Benchmark #3. (All figures in millions of 1978 dollars.)

	Benchmark #2	Benchmark #3	Alternatives H	G	D	E	F	C	B	A
Incremental Present Net Value	3.1	178.2	171.6	167.9	164.0	139.1	138.8	131.1	127.5	115.3
Difference in Present Net Value from Benchmark #3 (Opportunity Cost)	--	--	6.6	10.3	14.2	39.1	39.4	47.1	50.7	62.9
Difference in Benefits from Benchmark #3	--	--	18.5	3.4	-14.0	-0.9	-16.1	-28.5	8.5	-40.7
Difference in Costs from Benchmark #3	--	--	25.1	13.7	0.2	38.2	23.3	18.6	59.2	22.2

TABLE 5

Constraints Common to All Alternatives

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
All	Timber	Harvest Flow	Non-declining Yield	MMBF/yr	*	1-20	To ensure a continued supply of timber volume for local dependent industries throughout the planning horizon.
	Timber	Inventory	Ending Inventory constraint	MMBF/yr	*	20	To ensure that total inventory volume left at the conclusion of the planning horizon will equal or exceed the volume that would occur in a regulated forest managed in accordance with the prescriptions selected for regenerated timber.
	Timber	"Greater Than"	5	MMBF of Aspen/yr	*	1-5	To ensure sufficient aspen timber volume to support dependent industries in the area near Mancos, Colorado.
	Acreage	"Equal To"	(Varies by Analysis Area)	Acres	*	1-20	To ensure that the model would only allocate the exact number of acres of each analysis area type that is available on the Forest.
	Allocation/ Prescription	"Equal To"	(Varies by Prescription)	Acres	*	1-20	To ensure that the allocation selected during the first stage of the process was held constant during the scheduling phase of the process.

1/ Those constraints having an asterisk (*) in the column entitled "Binding" were limiting on the objective function (Maximize PNV) and can be attributed to at least part of the "opportunity costs" for that alternative.

TABLE 6

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
A	Timber	"Greater Than"	26	MMBF/yr	*	1	To ensure at least a minimum acceptable level of timber volume to sustain dependent industry.
		"Greater Than"	26	MMBF/yr		2	
		"Greater Than"	26	MMBF/yr		3	
		"Greater Than"	26	MMBF/yr	*	4	
		"Greater Than"	26	MMBF/yr		5	

TABLE 6 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
	Timber - Restocking of non-stocked land	"Greater Than"	4700	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this alternative up to management standards by 1985.
	Range	"Greater Than"	178,000	AUMS/yr	*	1	To ensure at least a "minimum acceptable level" of livestock forage to sustain dependent livestock industries.
		"Greater Than"	168,000	AUMS/yr	*	2	
		"Greater Than"	160,000	AUMS/yr	*	3	
		"Greater Than"	151,000	AUMS/yr		4	
		"Greater Than"	143,000	AUMS/yr		5	
	Wilderness Acreage	"Equal To"	All Wilderness Study Areas to Wilderness	Acres	*	1	To enhance production of non-market commodities derived from wilderness opportunities, such as backpacking, fishing, hunting, and day hiking.
	Budgetary Costs	"Less Than"	9.03	MM$/yr		1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		"Less Than"	8.53	MM$/yr		2	
		"Less Than"	7.78	MM$/yr		3	
		"Less Than"	7.93	MM$/yr		4	
		"Less Than"	7.50	MM$/yr		5	
B	Timber	"Greater Than"	40	MMBF/yr		1	To ensure a high level of timber volume consistent with the emphasis on market opportunities under this alternative.
		"Greater Than"	48	MMBF/yr		2	
		"Greater Than"	48	MMBF/yr		3	
		"Greater Than"	48	MMBF/yr		4	
		"Greater Than"	48	MMBF/yr		5	
	Timber - Restocking of non-stocked land	"Greater Than"	11,804	Acres	*	1	To ensure that a large number of non-stocked acres constituting part of the timber producing base are brought into production during the first decade. This is consistent with the emphasis on market opportunities.
	Spruce-fir Inventory	"Greater Than"	20% of the type must be in a clearcut condition.	Acres	*	1-5	To ensure that sufficient area of the spruce-fir timber type is in a clearcut condition at any one time to enhance water runoff.
	Douglas-fir Inventory	"Greater Than"	20% of the type must be in a clearcut condition.	Acres	*	1-5	To ensure that sufficient area of the Douglas-fir timber type is in a clearcut condition at any one time to enhance water runoff.

TABLE 6 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
	Range	"Greater Than"	172,000	AUMS/yr	*	1	To ensure a high level of livestock forage production consistent with the emphasis on market opportunities.
		"Greater Than"	189,000	AUMS/yr	*	2	
		"Greater Than"	199,000	AUMS/yr	*	3	
		"Greater Than"	209,000	AUMS/yr	*	4	
		"Greater Than"	219,000	AUMS/yr	*	5	
	Wilderness Acreage	"Equal To"	No Wilderness Study Areas to Wilderness	Acres	*	1	To allow the eventual production of timber, livestock, and other market commodities on Wilderness Study Areas in conjunction with the emphasis on market opportunities.
	Budgetary Costs	"Less Than"	10.00	MM$/yr	*	1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		"Less Than"	9.02	MM$/yr	*	2	
		"Less Than"	8.76	MM$/yr	*	3	
		"Less Than"	8.11	MM$/yr	*	4	
		"Less Than"	8.30	MM$/yr		5	
C	Timber	"Greater Than"	34	MMBF/yr	*	1	To ensure a level of timber consistent with emphasis on a mix of market and non-market opportunities, and to allow for maintaining current levels of timber production.
		"Greater Than"	34	MMBF/yr	*	2	
		"Greater Than"	34	MMBF/yr		3	
		"Greater Than"	34	MMBF/yr		4	
		"Greater Than"	34	MMBF/yr		5	
	Timber - Restocking of non-stocked land	"Greater Than"	4,700	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this alternative up to management standards by 1985.
	Range	"Greater Than	164,000	AUMS/yr	*	1	To ensure production of livestock forage at levels consistent with the emphasis on a mixture of market and non-market opportunities.
		"Greater Than"	179,000	AUMS/yr		2	
		"Greater Than"	179,000	AUMS/yr		3	
		"Greater Than"	179,000	AUMS/yr		4	
		"Greater Than"	179,000	AUMS/yr		5	
	Wilderness Acreage	"Equal To"	West Needle Study Area to Wilderness	Acres	*	2	To provide both wilderness and non-wilderness experiences on Wilderness Study Areas in conjunction with the emphasis on a mix of market and non-market opportunities.
	Budgetary Costs	"Less Than"	8.42	MM$/yr		1	To ensure that budget expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		"Less Than"	7.33	MM$/yr		2	
		"Less Than"	7.48	MM$/yr		3	
		"Less Than"	6.60	MM$/yr		4	
		"Less Than"	6.69	MM$/yr		5	

TABLE 6 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
D	Timber - Restocking of non-stocked lands	"Greater Than"	9,800	Acres	*	1	To ensure a level of restocking which maximizes the amount of land brought into timber production within the constraints of a reduced budget.
	Wilderness Acreage	"Equal To"	No Wilderness Study Areas to Wilderness	Acres	*	1	To ensure that the highest possible levels of market outputs such as timber, livestock forage, and developed recreation are produced within the constraints of reduced budgets.
	Budgetary Costs	"Less Than"	5.69	MM$/yr		1	To determine the level of market outputs that could be produced under 20 to 35 percent reductions in budgetary expenditures.
		"Less Than"	5.17	MM$/yr		2	
		"Less Than"	4.68	MM$/yr		3	
		"Less Than"	4.60	MM$/yr		4	
		"Less Than	4.37	MM$/yr		5	
E	Timber	"Greater Than"	33	MMBF/yr	*	1	To ensure timber production at levels sufficient to meet 1980 RPA goals for the Forest.
		"Greater Than"	34	MMBF/yr	*	2	
		"Greater Than"	35	MMBF/yr	*	3	
		"Greater Than"	35	MMBF/yr	*	4	
		"Greater Than"	40	MMBF/yr	*	5	
	Timber - Restocking of non-stocked lands	"Greater Than"	7,800	Acres	*	1	To ensure that sufficient non-stocked timber land is brought into production to meet 1980 RPA timber goals as well as produce such levels on a non-declining basis.
	Range	"Greater Than"	167,000	AUMS/yr	*	1	To ensure livestock forage production at levels sufficient to meet 1980 RPA goals for the Forest.
		"Greater Than"	169,000	AUMS/yr		2	
		"Greater Than"	169,000	AUMS/yr		3	
		"Greater Than"	170,000	AUMS/yr		4	
		"Greater Than"	170,000	AUMS/yr		5	
	Wilderness Acreage	"Equal To"	West Needle & Piedra Study Areas to Wilderness	Acres	*	1	These two areas were recommended for wilderness designation under the RARE II planning process.
F	Timber	"Greater Than"	33	MMBR/yr	*	1	To ensure a level of timber production consistent with current management projected into the future.
		"Greater Than"	34	MMBR/yr	*	2	
		"Greater Than"	35	MMBF/yr	*	3	
		"Greater Than"	35	MMBF/yr	*	4	
		"Greater Than"	40	MMBF/yr		5	

TABLE 6 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
	Timber - Restocking of non-stocked lands	"Greater Than"	11,800	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all lands suitable for timber management under this alternative up to management standards by 1985.
	Range	"Greater Than"	168,000	AUMS/yr	*	1	To ensure a level of livestock forage production consistent with current management projected into the future.
		"Greater Than"	170,000	AUMS/yr		2	
		"Greater Than"	169,000	AUMS/yr		3	
		"Greater Than"	167,000	AUMS/yr		4	
		"Greater Than"	165,000	AUMS/yr		5	
	Wilderness Acreage	"Equal To"	No Wilderness Study Areas to Wilderness	Acres	*	1	Although these areas are not recommended for wilderness designation, they are managed under Prescription K_3, which most nearly approximated "current management" on the three Wilderness Study Areas.
	Budgetary	"Less Than"	8.80	MM$/yr		1	To ensure that budgetary expenditures are consistent with current management projected into the future.
		"Less Than"	7.90	MM$/yr		2	
		"Less Than"	9.01	MM$/yr		3	
		"Less Than"	7.02	MM$/yr		4	
		"Less Than"	7.10	MM$/yr		5	
G	Timber	"Greater Than"	40	MMBF/yr	*	1	To ensure a maximum level of timber production consistent with a 10 percent reduction in budgets, reduced administrative regulation and an emphasis on market outputs.
		"Greater Than"	40	MMBF/yr		2	
		"Greater Than"	40	MMBF/yr		3	
		"Greater Than"	40	MMBF/yr	*	4	
		"Greater Than"	40	MMBF/yr		5	
	Timber - Restocking of non-stocked lands	"Greater Than"	9,800	Acres	*	1	To ensure a level of restocking on lands suitable for timber management consistent with budget reductions, reduced regulations, emphasis on market outputs, and non-declining yield constraints.
	Range	"Greater Than"	174,000	AUMS/yr	*	1	To ensure livestock forage production levels consistent with the emphasis on market outputs yet within the constraints imposed by 10 percent reductions in budgets.
		"Greater Than"	180,000	AUMS/yr		2	
		"Greater Than"	180,000	AUMS/yr		3	
		"Greater Than"	180,000	AUMS/yr		4	
		"Greater Than"	180,000	AUMS/yr		5	
	Wilderness Acreage	"Equal To"	All Wilderness Study Areas to Wilderness	Acres	*	1	To provide an alternative which emphasizes market outputs as well as recommends all Wilderness Study Areas for wilderness designation. This combination was requested by various individuals and organizations during one stage of the public involvement process.

TABLE 6 (Continued)

Constraints Specific to Each Alternative

Alternative	Output/ System	Type of Constraint	Constraint	Units	1/ Binding	Applicable Time Period	Rationale
	Budgetary Costs	"Less Than"	7.79	MM$/yr		1	To ensure that budgetary expenditures are reduced below current levels after the first decade.
		"Less Than"	6.64	MM$/yr		2	
		"Less Than"	6.06	MM$/yr		3	
		"Less Than"	5.89	MM$/yr		4	
		"Less Than"	5.94	MM$/yr		5	
H	Timber	"Greater Than"	40	MMBF/yr	*	1	To ensure timber production levels consistent with the emphasis on timber, water yield, livestock forage, and developed recreation.
		"Greater Than"	42	MMBF/yr	*	2	
		"Greater Than"	44	MMBF/yr	*	3	
		"Greater Than"	46	MMBF/yr	*	4	
		"Greater Than"	48	MMBF/yr		5	
	Timber	"Less Than"	10	MMBF Aspen/yr		1	To ensure that aspen production does not grossly exceed present and anticipated needs of local industries utilizing that species.
		"Less Than"	10	MMBF Aspen/yr		2	
		"Less Than"	10	MMBF Aspen/yr		3	
		"Less Than"	10	MMBF Aspen/yr	*	4	
		"Less Than"	10	MMBF Aspen/yr	*	5	
	Timber - Restocking of non-stocked lands	"Greater Than"	8,500	Acres	*	1	To ensure compliance with the National Forest Management Act in bringing all land suitable for timber management under this alternative up to management standards by 1985.
	Range	"Greater Than"	170,000	AUMS/yr		1	To ensure a level of livestock forage production consistent with emphasis on timber, water yield, livestock forage, and developed recreation.
		"Greater Than"	191,000	AUMS/yr	*	2	
		"Greater Than"	193,000	AUMS/yr		3	
		"Greater Than"	197,000	AUMS/yr		4	
		"Greater Than"	201,000	AUMS/yr	*	5	
	Wilderness	"Equal To"	West Needle & Piedra Wilderness Study Areas to Wilderness	Acres	*	1	To provide both wilderness and non-wilderness experiences on Wilderness Study Areas in conjunction with the emphasis on both market and non-market outputs.
	Budgetary Costs	"Less Than"	8.09	MM$/yr		1	To ensure that budgetary expenditures do not exceed reasonable levels for the outputs expected under this alternative.
		"Less Than"	7.60	MM$/yr	*	2	
		"Less Than"	6.69	MM$/yr		3	
		"Less Than"	6.39	MM$/yr		4	
		"Less Than"	6.36	MM$/yr		5	

1/ Those constraints having an asterisk (*) in the column entitled "Binding" were limiting on the objective function (Maximize PNV) and can be attributed to at least part of the "opportunity costs" for that alternative.

APPENDIX H

RESULTS OF BENCHMARK ANALYSIS

RESULTS OF BENCHMARK ANALYSIS

This appendix displays the results of benchmark analyses which are described in Chapter II. There are three tables: Table 1 describes the constraints and assumptions that were incorporated for each of the five benchmarks. The FORPLAN model was used for all but the minimum level benchmark. Outputs and costs were estimated by resource specialists for this benchmark. Table 2 displays the results of the economic analyses that were carried out for each benchmark level. Each benchmark was analyzed using both a 4 percent and a 7-1/8 percent discount rate. Table 3 displays estimates of average annual resource outputs for each benchmark during the first decade and over the 50-year planning horizon.

TABLE 1

Constraints and Assumptions Associated with Benchmark Levels

Alternative	Purpose	Objective Function	Harvest Flow Constraint	Ending Inventory Constraint Applied?	Outputs Valued in the Analysis	Basis Used for Output Values	Other Constraints and Assumptions
Benchmark #1-Minimum Level	To determine outputs, activities, and costs associated with applying minimum level management	Minimize Cost	(This benchmark was not analyzed using the FORPLAN model)	No	Water, dispersed recreation	"Willingness to pay"	1. Protect life, health, safety of incidental users. 2. Prevent impairment of productivity of the land. 3. Apply minimum level management on all areas of the Forest.
Benchmark #2-Maximum present net value of outputs having established market price	To show resource uses and outputs and costs resulting from mgt. direction that would maximize the present net value of all outputs having an established market price	Maximize present net value over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, developed recreation	"Willingness to pay" - Historical data used for timber prices -1980 RPA prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the analysis. 4. All capable, suitable, and available land area was used in FORPLAN analysis area acreage.
Benchmark #3-Maximum present net value of outputs having assigned value	To show resources and outputs and costs resulting from mgt. direction that would maximize the present net value of all outputs having an assigned value	Maximize present net value over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis.

TABLE 1 (Continued)

Constraints and Assumptions Associated with Benchmark Levels

Alternative	Purpose	Objective Function	Harvest Flow Constraint	Ending Inventory Constraint Applied?	Outputs Valued in the Analysis	Basis Used for Output Values	Other Constraints and Assumptions
							4. All capable, suitable, and available land area was used in FORPLAN analysis area acreage. 5. This benchmark was used in the maximum present net value tradeoff analysis shown in Table II-3.
Benchmark #4-Maximum timber level	To determine biological potential for timber production, subject to minimum standards of laws and regulations, without impairment of productivity of the land	Maximize timber in the first decade	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA prices used for all other outputs	1. Harvest level in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis. 4. All capable, suitable, and available land area was used in FORPLAN analysis area acreage constraints.
Benchmark #5-Maximum livestock forage level	To determine the biological potential for livestock forage production subject to minimum standards of laws and regulations, without impairment of productivity of the land	Maximize livestock forage over five decades	Sequential lower and upper bounds at 25 percent	Yes	Timber, livestock forage, dispersed and developed recreation, water	"Willingness to pay" - Historical data used for timber prices -1980 RPA prices used for all other outputs	1. Livestock forage in first decade constrained to at least 80 percent of current level. 2. Activity constrained to such a level that productivity of soil and water is not impaired. 3. Unused output capacity is not valued in the economic analysis. 4. All land capable, suitable, and available for livestock grazing was used in FORPLAN analysis area acreage constraints.

TABLE 2

Economic Analysis of Benchmark Levels at Discount Rates of 4 Percent and 7-1/8 Percent.*

Economic Parameter	Benchmark #1	#2	#3	#4	#5
4% Discount Rate					
Present Net Value, Incremental (Million Dollars)	1,224.0	28.4	334.0	217.5	274.2
Benefit Cost Ratio, Incremental	148.3	1.18	4.08	1.74	2.18
Incremental Discounted Benefits (Million Dollars)	1,232.3	182.2	442.5	511.7	505.6
Incremental Discounted Costs (Million Dollars)	8.3	153.8	108.5	294.1	231.5
7 1/8% Discount Rate					
Present Net Value, Incremental (Million Dollars)	782.9	3.1	178.2	94.0	132.2
Benefit Cost Ratio, Incremental	145.5	1.03	3.44	1.46	1.83
Total Discounted Benefits (Million Dollars)	788.4	106.4	251.1	297.6	290.6
Total Discounted Costs (Million Dollars)	5.4	103.4	72.9	203.6	158.4

*All figures, except those for Benchmark #1, are incremental above Benchmark #1 (Minimum Level Management).

TABLE 3

Average Annual Resource Outputs of the Benchmark Levels During the First Decade and Over 50 Years.*

Average Annual Resource Outputs	Benchmark #1	#2	#3	#4	#5
First Decade					
Timber (Million Cubic Feet)	0	9.2	8.2	60.2	26.7
Range (Thousand Animal Unit Months)	0	159.0	186.0	223.0	330.0
Recreation					
Developed (Thousand Visitor Days)	0	721.0	721.0	721.0	721.0
Dispersed (Thousand Visitor Days)	830.0	805.0	805.0	805.0	805.0
Winter Sports (Thousand Visitor Days)	0	449.0	449.0	449.0	449.0
Wilderness (Thousand Visitor Days)	118.0	60.0	60.0	60.0	60.0
Increased Water Yield (Thousand Acre-Feet)	0	22.0	24.3	54.1	26.1
Receipts to Treasury (Million Dollars)	0.2	2.5	2.1	35.8	5.4
50 Years					
Timber (Million Cubic Feet)	0	10.1	5.0	36.7	18.5
Range (Thousand Animal Unit Months)	0	177.0	220.0	261.0	412.0
Recreation					
Developed (Thousand Visitor Days)	0	1135.0	1135.0	1135.0	1135.0
Dispersed (Thousand Visitor Days)	366.0	1760.0	1495.0	1760.0	1760.0
Winter Sports (Thousand Visitor Days)	0	909.0	909.0	909.0	909.0
Wilderness (Thousand Visitor Days)	88.0	115.0	115.0	115.0	115.0
Increased Water Yield (Thousand Acre-Feet)	0	22.8	23.7	96.7	37.2
Receipts to Treasury (Million Dollars)	0.2	2.7	2.0	21.2	5.1

*Outputs are incremental above Minimum Level Management (Benchmark #1).

APPENDIX I

UNSUITABILITY ASSESSMENT FOR ALL OR CERTAIN STIPULATED METHODS OF COAL MINING WITHIN KNOWN RECOVERABLE COAL RESOURCE AREAS IN THE SAN JUAN NATIONAL FOREST

UNSUITABILITY ASSESSMENT FOR ALL OR CERTAIN STIPULATED METHODS OF COAL MINING WITHIN KNOWN RECOVERABLE COAL RESOURCE AREAS IN THE SAN JUAN NATIONAL FOREST

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INTRODUCTION AND PURPOSE

On August 3, 1977, the President signed into law the Surface Mining Control and Reclamation Act. Section 522 of the Act requires the Secretary of the Interior to conduct a Federal lands review in order to determine those lands unsuitable for surface coal mining or surface operations and impacts of underground coal mining.

Twenty criteria have been developed (43 CFR 3461.1) to assess the unsuitability for mining of areas of medium to high potential for coal recovery. These areas are classified by the U. S. Geological Survey as Known Recoverable Coal Resource Areas (KRCRA's). The criteria will aid land managers in identifying those areas with key features, principally environmental, that cannot properly be protected if subjected to mining. Application of the unsuitability criteria will ensure that protection of the most sensitive and valuable environmental features of Federal lands is accomplished in a consistent, uniform, and objective manner so that coal development planning will be concentrated in areas where environmental conflicts are less likely to add delay, cost, or conflict to production efforts.

The unsuitability criteria are designed to be applied only to those areas in which surface (strip) mining of coal will occur, or to those areas in which underground mining of coal will produce surface effects which include disturbance to surface occupancy, subsidence, fire, and other detrimental environmental impacts to Federal lands. Areas in which underground mining of coal will not produce such surface effects are exempt from application of the criteria.

The Memorandum of Understanding between the Departments of Agriculture and Interior, signed May 20, 1980, assigned the Forest Service the responsibility for assessing those areas within National Forest boundaries which contain federally owned coal resources classified by the U. S. Geological Survey as KRCRA's.

The assessment process for coal resource lands within the San Juan National Forest has been undertaken as an integral part of the comprehensive land-use planning effort by the Forest Interdisciplinary Team. Results of the assessment process will support land allocation decisions and help determine the direction of coal resource development over the life of the Forest Land Management Plan. This Appendix contains the results achieved to date and serves to notify interested individuals and local, State, and Federal agencies of the recommended decisions on coal-related land use within the classified coal resource lands of the Forest, and to invite comment on those decisions.

DESCRIPTION OF THE UNSUITABILITY ASSESSMENT PROCESS

This Appendix to the Environmental Impact Statement for the San Juan National Forest Land Management Plan describes the unsuitability assessment process involving the application of 20 unsuitability criteria adopted by the Secretary of the Interior and delegated to the Forest Service, Department of Agriculture, and the results of their application. These 20 criteria can be divided into four categories:

1. Those required under Section 522 of the Surface Mining Control and Reclamation Act (SMCRA)(e.g., Federal land systems, buffer zones along rights-of-way and easements or adjacent to communities and buildings);

2. Criteria discretionary under Section 522 of SMCRA (e.g., lands used for scientific studies, municipal watersheds, and floodplains);

3. Other requirements under statute which the Department chooses to enforce through application of specific criteria (e.g., Federally listed endangered species, and bald and golden eagle protection); and

4. Those resources which are not addressed specifically by statute, but which are of high public interest (e.g., scenic areas, state fish and wildlife and state lands criteria).

The 20 criteria were applied within limits imposed by the availability of existing data. If sufficient data were not available to apply the criteria, areas were considered suitable subject to additional information that may come from public comment or during activity planning, lease sale, or post-lease sale activities.

The process for assessing National Forest lands unsuitable for coal mining involves six steps, the first four of which have been accomplished:

1. Federal lands (i.e., National Forest System and other lands with federally owned coal) contained within a Known Recoverable Coal Resource Area (KRCRA) as classified by the U. S. Geological Survey were considered suitable, subject to application of the unsuitability criteria.

2. Exemptions to the unsuitability criteria were studied for possible application. Exemptions would remove coal lands from further assessment, retaining them as suitable for coal mining.

3. The unsuitability criteria were studied for possible application. Application of a criterion would render coal lands unsuitable for all or certain stipulated methods of coal mining and remove them from further consideration for leasing.

4. Exceptions to the unsuitability criteria were studied for possible application. Exceptions would allow coal mining to proceed subject to certain stipulations which would be attached to the lease or mining permit.

Remaining steps to be completed are:

5. Areas where leasing may take place, as determined by the preceding four steps, will not include lands where other resources and uses are determined during land management planning to be more important than coal production. These multiple-use decisions will also determine when other resources and uses may be temporarily or permanently modified to allow for coal leasing and production.

6. Within 2 years prior to proposed leasing of Federal coal for surface mining, owners of land which overlies Federal coal within the proposed lease will be consulted and asked to state their preference for or against the leasing of Federal coal under their land. If a significant number of surface owners opposes leasing of Federal coal under their land, leasing may be dropped by the Bureau of Land Management from further consideration in that area.

Future actions which may affect the recommended designations of unsuitability of coal resource lands on the San Juan National Forest include:

1. Acquisition of more detailed information concerning land or resource values;

2. Public comment, and consultation with Federal and State agencies, as required by Title 43, Code of Federal Regulations, Part 3461.3-2;

3. Governmental review of the Federal Coal Management Program and attendant regulations;

4. Site-specific evaluation of an operating plan for a proposed coal mine, or assessment of lands included in a proposed coal lease; and

5. Petitions for change of designation of unsuitability of coal resource lands.

LOCATION AND DESCRIPTION OF UNSUITABILITY ASSESSMENT AREAS

The San Juan National Forest contains two areas within the Durango KRCRA. These have been designated as Unsuitability Assessment Areas (UAA's) and are shown in Figure 1.

Unsuitability Assessment Area 1 (UAA 1) is an 80 acre tract within the Mancos Ranger District in Montezuma County. UAA 1 is Federally owned in both surface and mineral estate and consists of a portion of the east-facing slope of Menefee Mountain near U. S. Highway 160 with no improvements (Figure 2). There has been no historical production of coal or other mineral resources from UAA 1; current land use is limited to two Special Use grazing pastures. No Federal coal leases or applications are pending. UAA 1 partially contains one Federal oil and gas lease; potential for occurrence of oil and gas is medium to high. Coal in UAA 1 is recoverable by either surface or underground mining.

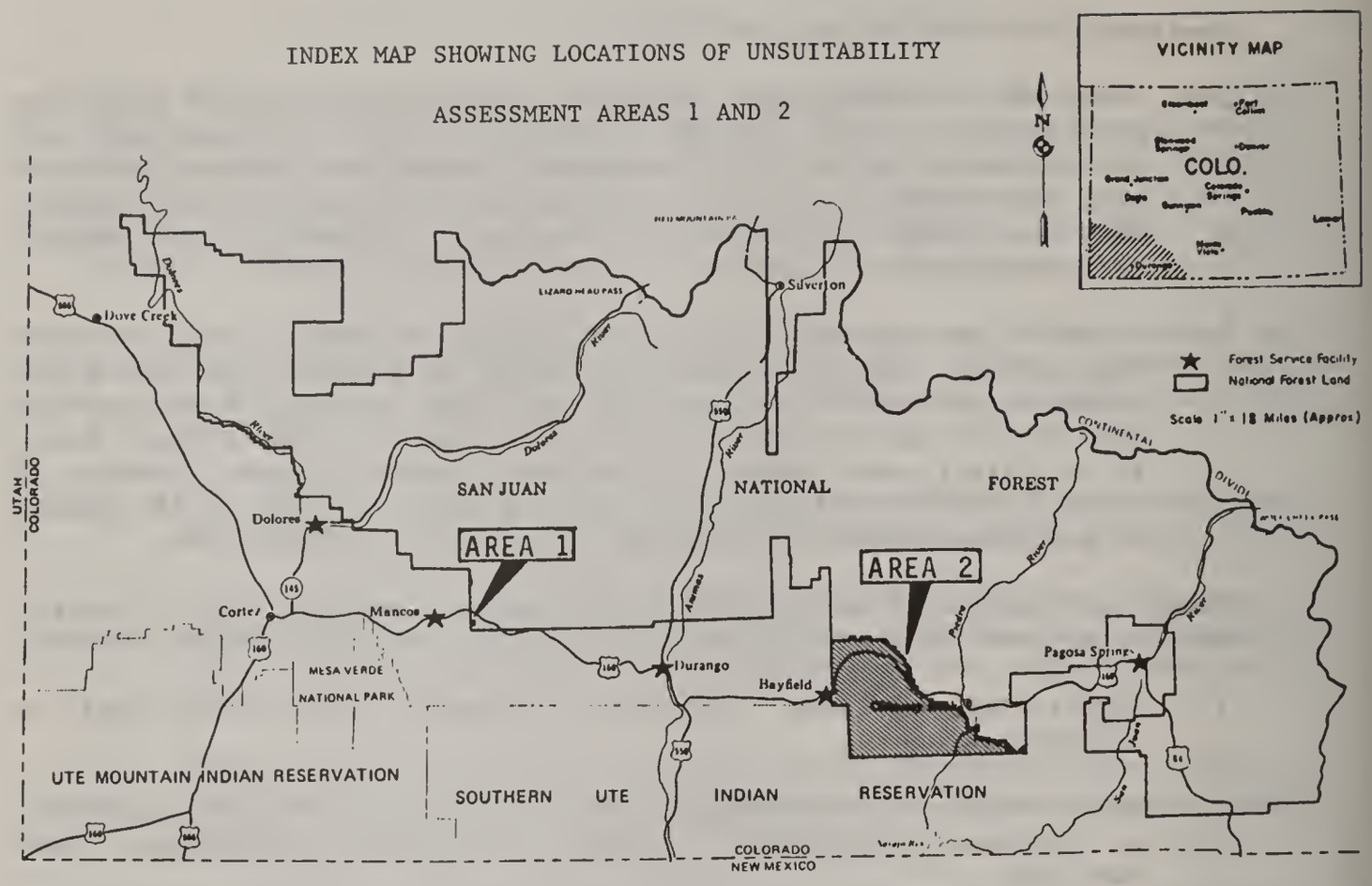


FIGURE 1

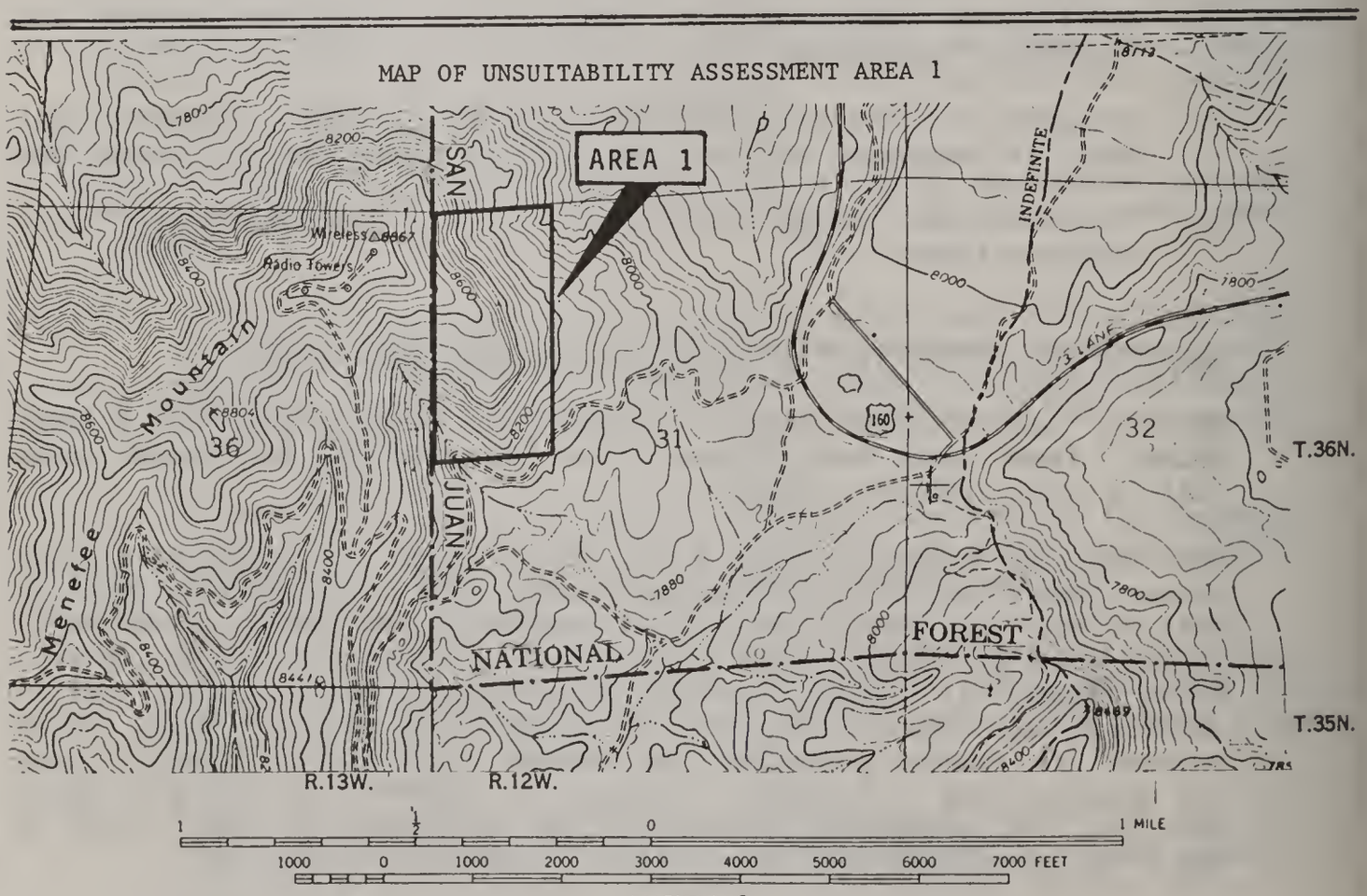


FIGURE 2

Unsuitability Assessment Area 2 (UAA 2) consists of approximately 75,300 acres on the Pine and Pagosa Ranger Districts in La Plata and Archuleta Counties (Figure 3). The tract contains varied terrain including the H-D Mountains and the drainages of the Piedra River and Stollsteimer, Beaver and Spring Creeks, among others. Land ownership patterns are complex and include Federal ownership of coal only, surface only, both coal and surface, and neither; as well as varied state and private ownerships of coal and surface. Improvements include U. S. and State roads, Forest System roads, radio facilities, natural gas pipelines, electric transmission lines, fences and erosion control projects. A portion of this tract is within the Chimney Rock Archaeological Area and the entire tract is potentially rich in cultural resources.

Areas of private ownership of coal under Federal surface ownership (alienated rights), and private coal and surface ownership, are not subject to assessment according to 43 CFR 3461. These areas, combined as shown in Figure 3, comprise approximately 16,000 acres, or approximately 20 percent of the 75,300 acres of UAA 2.

Current land use is varied. Beyond the improvements listed above, UAA 2 lies within two grazing allotments; two timber sales are scheduled for completion in 1981, and one timber sale will be offered in October of 1982. The area wholly or partially contains 43 Federal oil and gas leases and three Federal oil and gas lease applications. Several wells have been drilled or completed in the Zabel Canyon-Spring Creek area, which contains a proven reserve of natural gas. Potential for occurrence of oil and natural gas is medium to high throughout UAA 2.

Coal production within UAA 2 has historically been minor. One strip mine is currently active on privately owned coal and surface along Stollsteimer Creek. The operator of this mine, Chimney Rock Coal, has a pending Federal emergency coal lease application for approximately 45 acres of National Forest land adjacent to the present open-pit operation. As of January 1982, no other Federal coal lease applications or leases exist within UAA 2.

Coal in UAA 2 is recoverable by either surface or underground mining methods.

SUMMARY OF RESULTS OF THE UNSUITABILITY CRITERIA APPLICATION

Completion of Steps 1-4 of the unsuitability assessment process resulted in the following recommended unsuitability designations:

UAA 1: 80 acres (100 percent) of UAA 1 were found to be unsuitable for surface coal mining under unsuitability criterion 2. Underground methods of coal mining would be permitted.

UAA 2: Approximately 15,060 acres (25 percent) of UAA 2 were found to be unsuitable for all methods of coal mining under unsuitability criteria 3, 7, and 19. All methods of coal mining would be permitted on the remaining 44,240 acres of assessed land in UAA 2, with appropriate mitigation of surface impacts to protect specific surface values.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LAND AND COAL OWNERSHIP PATTERNS AND CULTURAL FEATURES

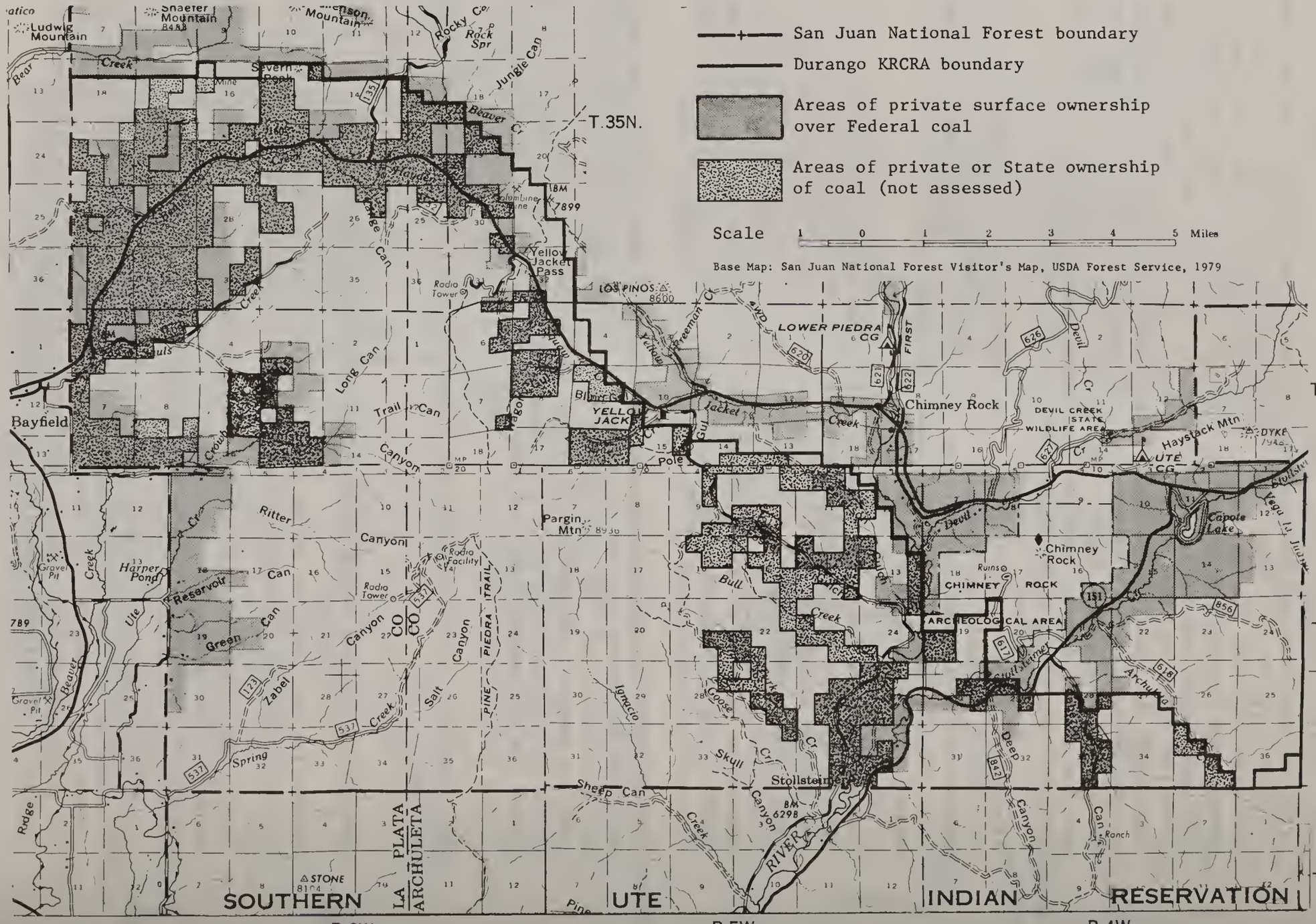


FIGURE 3

Following is a summary of the results in each step of the unsuitability assessment process.

In the first step, Unsuitability Assessment Areas 1 and 2 were delineated. Eighty areas (100 percent) of UAA 1 and 59,300 acres (about 80 percent) of UAA 2 were determined to be subject to the unsuitability assessment process. The remaining 16,000 acres (20 percent) of UAA 2 were not subject to assessment because the coal in these areas is not owned by the Federal government.

In the second step, exemptions to the unsuitability criteria were studied. No exemptions were found to be applicable; therefore, no lands were removed from consideration in this step.

The third step involved application of the unsuitability criteria. Sixteen of the 20 unsuitability criteria were found not to apply to UAA 1; one criterion could not be applied due to lack of information. Seven unsuitability criteria did not apply to UAA 2, and three unsuitability criteria could not be applied due to lack of knowledge. The remaining three unsuitability criteria which applied to UAA 1 and ten unsuitability criteria which applied to UAA 2 were used to delineate areas unsuitable for surface and/or underground coal mining. Table 1 lists the criteria and their applicability.

TABLE 1

Criteria Applicable to Unsuitability Assessment Areas

Criterion Number	Criterion Title	Applicable to UAA 1	Applicable to UAA 2
1	Federal Land Systems	Yes	Yes
2	Rights-of-Way and Easements	Yes	Yes
3	Buffer Zones Along Rights-of-Way	No	Yes
4	Wilderness Study Areas	No	No
5	Scenic Areas	No	No
6	Lands Used for Scientific Studies	No	No
7	Historic Lands and Sites	*	Yes
8	Natural Areas	No	No
9	Federally Listed Endangered Species	No	Yes
10	State Listed Endangered Species	No	Yes
11	Bald and Golden Eagle Nests	No	*
12	Bald and Golden Eagle Roost and Concentration Areas	No	Yes
13	Falcon Cliff Nesting Sites	No	*
14	Migratory Birds	Yes	Yes
15	State Resident Fish and Wildlife	No	Yes
16	Floodplains	No	*
17	Municipal Watersheds	No	No
18	National Resource Waters	No	No
19	Alluvial Valley Floors	No	Yes
20	State Proposed Criteria	No	No

* Not applied due to lack of adequate information.

After application of the unsuitability criteria both UAA 1 and UAA 2 were considered unsuitable for any method of coal mining. This designation affected the total 59,380 acres of assessed lands in both areas.

In the fourth step, exceptions to the unsuitability criteria were studied for application. In UAA 1, exceptions were found to apply to the three applicable unsuitability criteria. In UAA 2, exceptions were found to apply to seven of the ten applicable unsuitability criteria. Table 2 lists the criteria for which exceptions were applied.

TABLE 2

Application of Exceptions to Criteria

Criterion Number	Criterion Title	Applicable to UAA 1	Applicable to UAA 2
1	Federal Land Systems	Yes	Yes
2	Rights-of-Way and Easements	Yes	Yes
3	Buffer Zones Along Rights-of-Way	-	No
7	Historic Lands and Sites	-	No
9	Federally Listed Endangered Species	-	Yes
10	State Listed Endangered Species	-	Yes
12	Bald and Golden Eagle Roost and Concentration Areas	-	Yes
14	Migratory Birds	Yes	Yes
15	State Resident Fish and Wildlife	-	Yes
19	Alluvial Valley Floors	-	No

After application of the exceptions, all 80 acres of UAA 1 were found to be unsuitable for surface coal mining but suitable for underground coal mining with appropriate protection of the surface from mining operations and impacts. This designation affects 100 percent of UAA 1 (Figure 2).

In UAA 2, approximately 15,060 acres were retained as unsuitable for all methods of coal mining after application of the exceptions listed in Table 2. The remaining 44,240 acres of assessed land in UAA 2 were considered suitable for surface coal mining and underground coal mining with appropriate protection of the surface from mining operations and impacts. Figure 4 illustrates the results of the four completed steps of the unsuitability assessment process for UAA 2. Table 3 lists the acreage and percentages of lands designated as unsuitable in both UAA 1 and UAA 2.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING RESULTS OF ASSESSMENT PROCESS

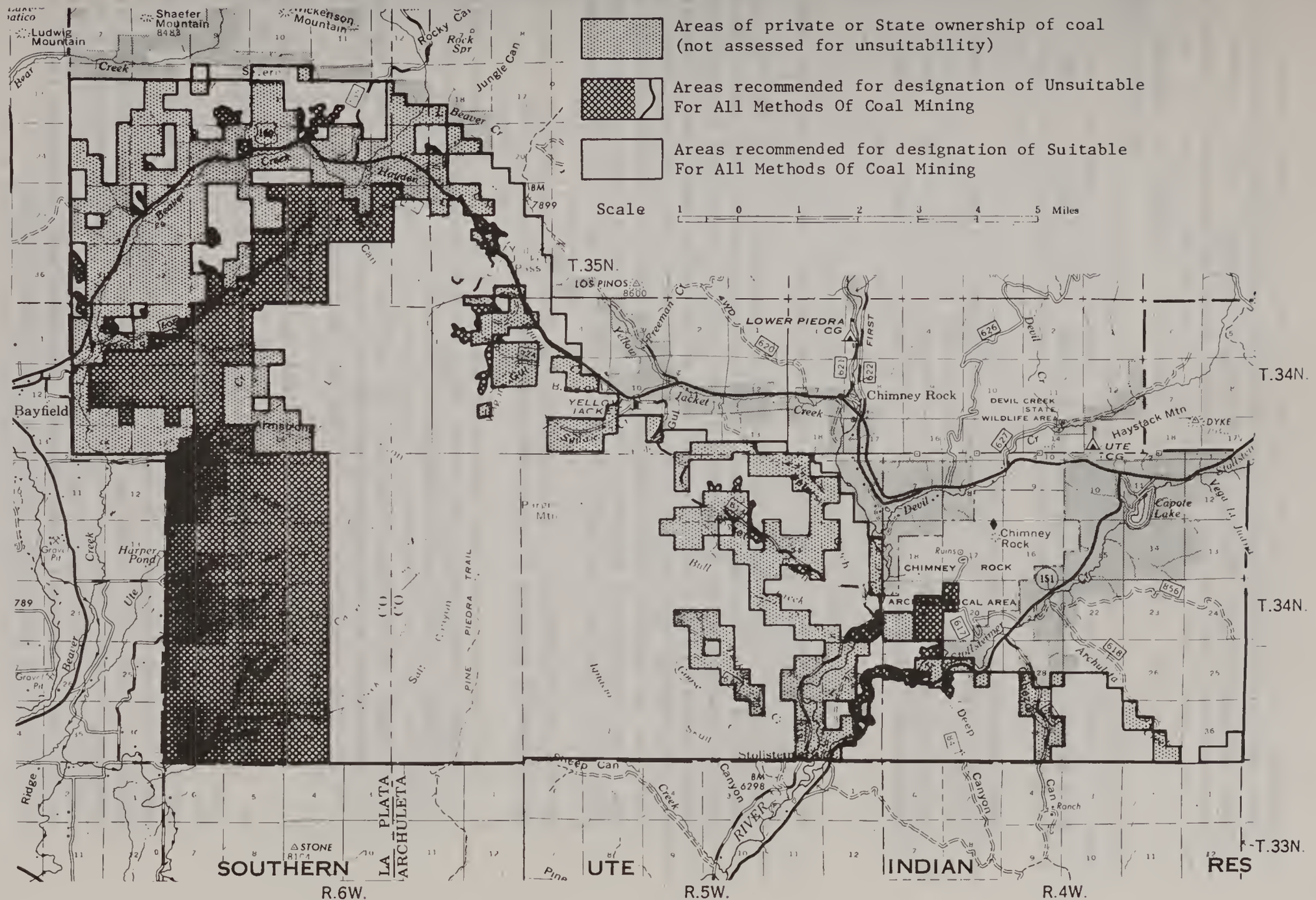


FIGURE 4

TABLE 3

Land Unsuitable After Completion of Steps 1 through 4

		Acres	Percent (Assessed Land)
Area Unsuitable for Surface Mining of Coal	UAA 1	80	100
	UAA 2	15,060	25
Area Unsuitable for Underground Mining of Coal	UAA 1	0	0
	UAA 2	15,060	25
Area Unsuitable for All Methods of Coal Mining	UAA 1	0	0
	UAA 2	15,060	25

UAA 1 was considered suitable for underground mining methods only.

Approximately 15,060 acres in UAA 2 were considered unsuitable for all methods of coal mining. Lands considered unsuitable are those which clearly should not be mined because of resource conflicts and environmental sensitivities which cannot be mitigated or which would require stipulations in the lease or mining permit so restrictive that mining would be uneconomic. The remaining 44,240 acres of assessed land in UAA 2 are considered suitable for mining of coal at this stage of the assessment process and may be considered further for coal leasing.

The impact of unsuitability designation on the environment may result in the following maximum or worst-case effects:

1. No disturbance to any surface resources or values in areas designated as unsuitable for both surface and underground mining (25 percent of coal lands assessed in this study).

2. Surface disturbance limited to surface operations and impacts incidental to underground mining in areas designated as suitable for underground mining only (UAA 1 - 80 acres).

3. Surface disturbance due to surface mining, and surface operations and impacts incidental to underground mining in areas designated as suitable for all methods of coal mining (75 percent of coal lands assessed in this study).

The impact of unsuitability designation on the local economy will be minor. Economic support of the area by the coal production industry is limited. There has been no production of coal from Unsuitability Assessment Area 1 (UAA 1). While production of coal from UAA 2 has occurred since the late 1800's, it has been sporadic and of limited scope. Coal recovered from the area has been for dominantly local use as fuel for ore smelters, railroads, and space heating.

Current production on UAA 2 is solely from the Chimney Rock Coal Company mine on privately owned land and coal along Stollsteimer Creek south of Chimney Rock. Production in 1981 was 255,011 tons, a sharp increase over previous years' coal recovery. Several smaller mines were active in 1979 within the Durango KRCRA but outside of the Forest; total production in 1979 from these mines was 97,412 tons of coal.

Other than the emergency lease application submitted by Chimney Rock Coal, interest in development of coal resources on the Forest by industry has been generally lacking. Information supplied by the San Juan River Regional Coal Team indicates no further leasing of coal is expected before 1987.

Due to the limited amount of coal within the Unsuitability Assessment Areas of the San Juan National Forest and the current low demand for those coal resources, the designation of unsuitability is unlikely to present a serious adverse impact to coal development, the environment, the economy, or the supply of coal.

FINDINGS OF INDIVIDUAL CRITERION AND EXCEPTION APPLICATION

Criterion Number 1 "All Federal lands included in the following land systems or categories shall be considered unsuitable: National Park System, National Wildlife Refuge System, National System of Trails, National Wilderness Preservation System, National Wild and Scenic Rivers System, National Recreation Areas, lands acquired with money derived from the Land and Water Conservation Fund, National Forest, and Federal lands in incorporated cities, town, and villages."

Both Unsuitability Assessment Areas (UAA's) 1 and 2 are considered unsuitable for all methods of coal mining involving surface coal mining operations. This includes strip mining, and underground mining where there would be surface-disturbing operations and impacts.

Exception: A lease may be issued within the boundaries of the Forest if no significant recreational, timber, economic, or other values exist which may be incompatible with the lease; and surface operations and impacts are incidental to an underground coal mine, or surface mining may be in compliance with the Multiple-Use Sustained Yield Act of 1960, the Federal Coal Leasing Amendments Act of 1976 and the Surface Mining Control and Reclamation Act of 1977.

There are no significant recreational, timber, economic, or other values in UAA 1 (80-acre tract) or UAA 2 (75,300-acre tract) which are incompatible with surface operations and impacts incidental to an underground coal mine. Stipulations on mining methods and mitigation of surface effects can provide adequate protection for recreational facilities and sites, timber areas, mineral leases other than coal, mining claims for locatable minerals, and sources of salable minerals. Determination of compliance with the Acts cited in the exception requires site-specific operating plans for each mining proposal involving surface mining operations.

Finding: Unless other criteria apply, both UAA 1 and UAA 2 are considered suitable for all methods of coal mining including surface mining operations.

Criterion Number 2 - "Federal lands that are within rights-of-way or easements or within surface leases for residential, commercial, industrial, or other public purposes, or for agricultural crop production on Federally owned surface shall be considered unsuitable."

This criterion applies to both areas of the KRCRA on the Forest. Unsuitability Assessment Area 1 (UAA 1) is contained within 2 special use pastures. Unsuitability Assessment Area 2 (UAA 2) is contained within the H.D.'s, Turkey Exclosure, and Chimney Rock grazing allotments and contains rights-of-way for U.S. and State roads, Forest system roads and easements for pipelines and electric lines. Other uses include radio facilities and fences.

Exception: A lease may be issued and mining operations approved in these areas if all or certain types of coal development will not interfere with the purpose of the right-of-way, easement, or other special use.

This exception applies to UAA 1 for underground mining only.

Coal mining with properly mitigated surface operations and impacts will not interfere with grazing uses in UAA 2. Location of surface operations and impacts of all methods of coal mining away from road, fence, gas and electric lines and radio facility sites will prevent interference with these uses.

Finding: UAA 1 is unsuitable for surface coal mining (80 acres). UAA 2 is suitable for all methods of coal mining with mitigation of surface impacts (59,300 acres).

Criterion Number 3 - "Federal lands affected by Section 522(e) (4) and (5) of the Surface Mining Control and Reclamation Act of 1977 shall be considered unsuitable. This includes lands within 100 feet of the outside line of the right-of-way of a public road or within 100 feet of a cemetery, or within 300 feet of any public building, school, church, community or institutional building or public park or within 300 feet of an occupied dwelling."

This criterion does not apply to UAA 1. UAA 2 (Figure 5) contains portions of U.S. 160 and Colorado 151 to which this criterion applies. These areas are considered to be unsuitable for coal mining (190 acres).

No exceptions apply to either area of the KRCRA on the Forest.

Finding: The portions of the U.S. 160 and Colorado 151 road corridors subject to Criterion 3 are unsuitable for coal mining.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LANDS AFFECTED BY CRITERION 3

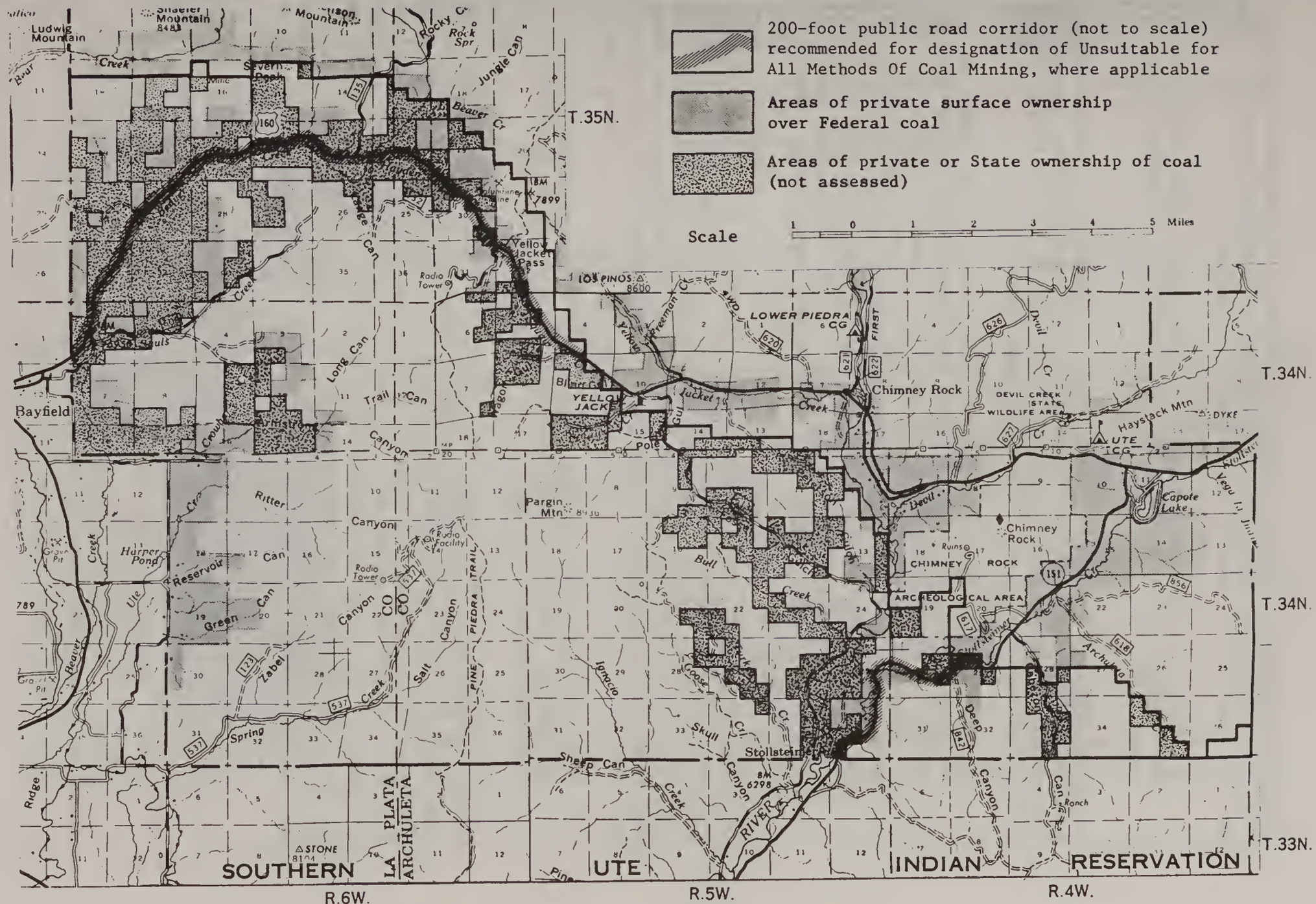


FIGURE 5

Criterion Number 4 - "Federal lands designated as wilderness study areas shall be considered unsuitable while under review by the Administration and the Congress for possible wilderness designation."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are designated as wilderness study areas.

Criterion Number 5 - "Scenic Federal lands designated by visual resource management analysis as Class I (an area of outstanding scenic quality or high visual sensitivity) but not currently on the National Register of Natural Landmarks shall be considered unsuitable.

This criterion does not apply to either area of the KRCRA on the Forest. Highway 160, a major travelway in UAA 2, and the portion of the Chimney Rock Archaeological Area which overlaps the KRCRA in UAA 2 are both areas of visual sensitivity level 1 but do not qualify as BLM Visual Resouce Class I areas. Portions of the Highway 160 travel corridor are considered unsuitable under Criterion 3 and the Chimney Rock portion of the KRCRA is considered unsuitable under Criterion 7.

Criterion Number 6 - "Federal lands under permit by the surface management agency, and being used for scientific studies involving food or fiber production, natural resouces, or technology demonstrations and experiments shall be considered unsuitable for the duration of the study demonstration or experiment, except where mining could be conducted in such a way as to enhance or not jeopardize the purposes of the study."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are being used for the purposes described in the criterion.

Criterion Number 7 - "All districts, sites, buildings, structures, and objects of historic, architectural, archaeological, or cultural significance on Federal lands which are included in or eligible for inclusion in the National Register of Historic Places, and an appropriate buffer zone around the outside boundary of the designated property (to protect the inherent values of the property that make it eligible for listing in the National Register) as determined by the surface management agency, in consultation with the Advisory Council on Historic Preservation and the State Historic Preservation Office shall be considered unsuitable."

Lack of adequate information prevents assessment of UAA 1 and portions of UAA 2 under this criterion. Portions of UAA 2 which have been assessed and are considered to be unsuitable for coal mining are located in the western part of UAA 2 and in the Chimney Rock Archaeological Area. These areas are eligible for inclusion in the National Register of Historic Places. Three smaller areas have been assessed and found to present no conflicts with any method of coal mining under this criterion (Figure 6).

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LANDS AFFECTED BY CRITERION 7

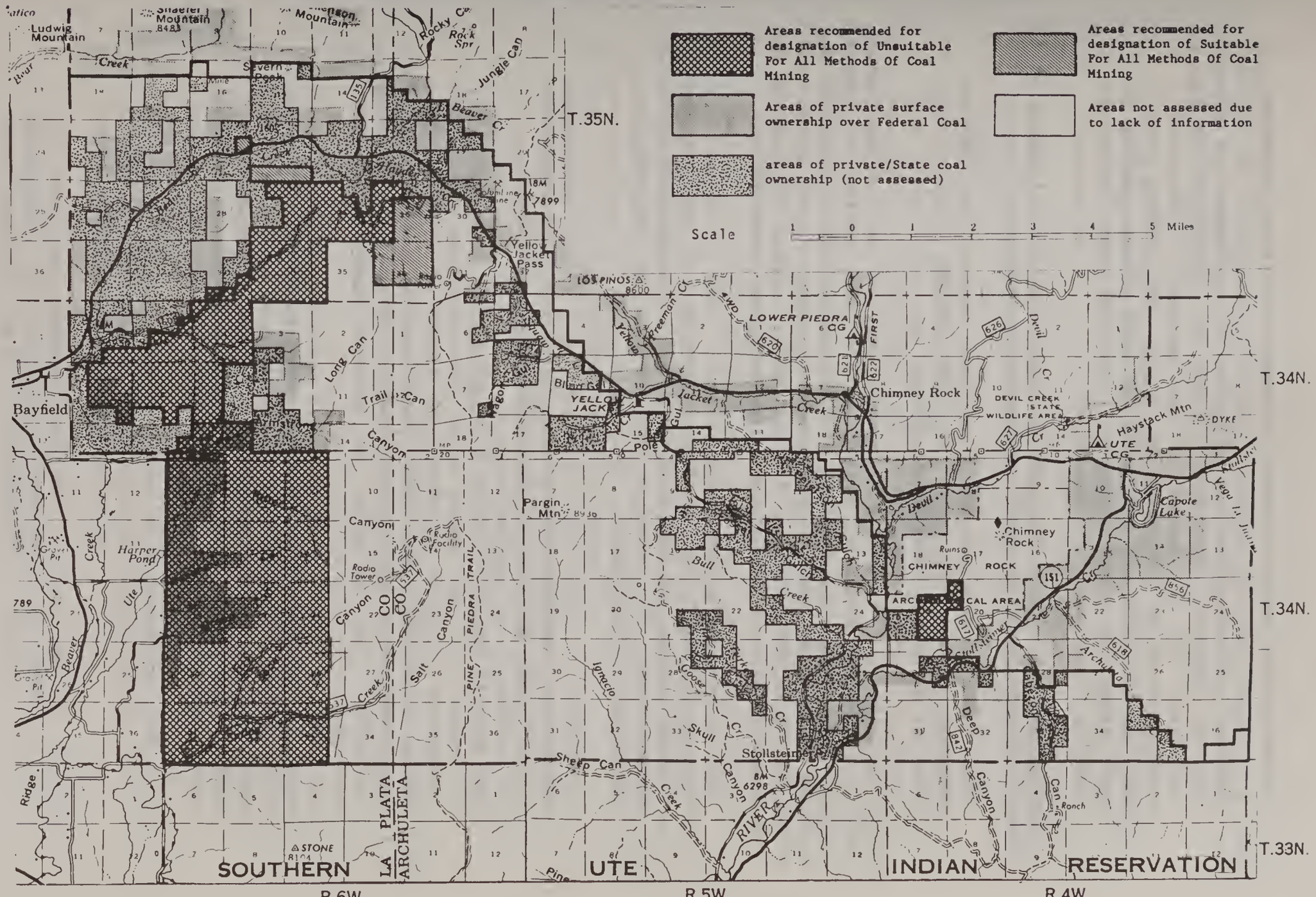


FIGURE 6

No exceptions apply to areas assessed under this criterion.

Finding: Areas which are eligible for inclusion in the National Register of Historic Places are considered to be unsuitable for any method of coal mining (13,390 acres). Areas assessed as presenting no conflict with mining activities are suitable for any method of coal mining, subject to application of other criteria. Remaining areas cannot be assessed due to lack of adequate data.

Criterion Number 8 - "Federal lands designated as natural areas or as National Natural Landmarks shall be considered unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas have been designated as natural areas or as National Natural Landmarks.

Criterion Number 9 - "Federally designated critical habitat for threatened or endangered plant and animal species, and habitat for Federal threatened or endangered species which is determined by the Fish and Wildlife Service and the surface management agency to be of essential value and where the presence of threatened or endangered species has been scientifically documented, shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land delineated jointly by the Forest Service and the Fish and Wildlife Service as essential habitat for the American peregrine falcon. This area is considered to be unsuitable for mining under Criterion 9.

Exception: A lease may be issued and mining operations approved if the proposed activity is not likely to jeopardize the continued existence of the species and/or habitat.

The area to which Criterion 9 is applicable is suitable for all methods of coal mining under this exception with proper mitigation of surface operations and impacts; including minimizing of vehicular and human activities and surface use of explosives during the period February - August and minimizing disturbance to vegetation to preserve habitat for prey species.

Finding: The area delineated as essential habitat for peregrine falcon is suitable for all methods of coal mining with mitigation of surface operations and impacts (14,260 acres). Unless other criteria apply, all other portions of the KRCRA areas are suitable for any coal mining activities.

Criterion Number 10 - "Federal lands containing habitat determined to be critical or essential for plant or animal species listed by a state pursuant to state law as endangered or threatened shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land considered to be essential habitat for the river otter. This area is considered to be unsuitable for mining under Criterion 10.

Exception: A lease may be issued and mining operations approved if the proposed activity will not adversely affect the species.

The area to which Criterion 10 is applicable is suitable for all methods of coal mining under this exception if surface operations and impacts are not allowed to disturb the riparian habitat.

Finding: The area considered to be essential habitat for river otter is suitable for all methods of coal mining with mitigation of surface operations and impacts (980 acres). Unless other criteria apply, all other portions of the KRCRA areas are suitable for any coal mining activities.

Criterion Number 11 - "A bald or golden eagle nest or site on Federal lands that is determined to be active and an appropriate buffer zone of land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

This criterion does not apply to UAA 1. There are at present no known bald or golden eagle nesting sites in UAA 2. Pending information from the Colorado Division of Wildlife, this criterion will not be applied to UAA 2 due to lack of knowledge.

Criterion Number 12 - "Bald and golden eagle roost and concentration areas on Federal lands used during migration and wintering shall be considered unsuitable."

This criterion does not apply to UAA 1. UAA 2 contains land in the Piedra River-Stollsteimer Creek drainage which is known to be a winter roosting area for bald eagles; this area has been recommended as essential habitat for bald eagles. Such areas are considered under this criterion to be unsuitable for coal mining.

Exception: A lease may be issued if mining activities can be carried out with such limitations of method and time period that eagles are not adversely affected.

This area is considered suitable for all methods of coal mining under this exception if vehicular and human activities are minimized during the period December - March.

Finding: The area known to be a winter roosting area for bald eagles in UAA 2 is suitable for all methods of coal mining with limitations on surface operations and impacts (4,520 acres). Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

Criterion Number 13 - "Federal lands containing a falcon (excluding kestrel) cliff nesting site with an active nest and a buffer zone of Federal land around the nest site shall be considered unsuitable. Consideration of availability of habitat for prey species and of terrain shall be included in the determination of buffer zones."

This criterion does not apply to UAA 1. There are at present no known falcon nesting sites in UAA 2. Pending information from the Colorado Division of Wildlife, this criterion will not be applied to UAA 2 due to lack of knowledge.

Criterion Number 14 - "Federal lands which are high priority habitat for migratory bird species of high Federal interest on a regional or national basis, as determined jointly by the surface management agency and the Fish and Wildlife Service, shall be considered unsuitable."

Both Unsuitability Assessment Areas (UAA's) are used intermittently during the spring, summer and fall by band-tailed pigeons. These lands are used primarily as forage grounds and are considered to be unsuitable for coal mining under this criterion.

Exception: A lease may be issued if mining activity will not adversely affect the habitat during use by the species.

These areas are considered suitable for all methods of coal mining under this exception if disturbance to the vegetative cover by surface operations and impacts is minimized.

Finding: UAA 1 and UAA 2 are suitable for all methods of coal mining with minimal disturbance of vegetation (59,380 acres).

Criterion Number 15 - "Federal lands which the surface management agency and the state jointly agree are fish and wildlife habitat for resident species of high interest to the state and which are essential for maintaining these priority wildlife species shall be considered unsuitable. Examples of such lands which serve a critical function for the species involved include:

(i) Active dancing and strutting grounds for sage grouse, sharp-tailed grouse, and prairie chicken;
(ii) Winter ranges most critical for deer, antelope, and elk; and
(iii) Migration corridors for elk."

This criterion does not apply to UAA 1. UAA 2 contains lands delineated jointly with the Colorado Division of Wildlife as (1) key winter range for deer and elk; (2) elk calving area; and (3) elk migration corridor. These areas are considered to be unsuitable for mining under this criterion.

Exception: A lease may be issued if coal mining will not have a significant long-term impact on the species.

(1) Key winter range critical for the survival of deer and elk is suitable for all methods of coal mining under this exception if vehicular and human activity is curtailed during the period December - March, and roads are kept below a maximum of 2 miles per section (23,140 acres).

(2) Elk calving area is suitable for all methods of coal mining if no activity occurs in the area during May and June (1,280 acres).

(3) Elk migration corridor is suitable for all methods of coal mining if roads are kept below a maximum of 2 miles per section (41,900 acres).

Finding: Lands in UAA 2 to which Criterion 15 applies are suitable for all methods of coal mining with proper mitigation of surface operations and impacts (46,760 acres). Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

Criterion Number 16 - "Federal lands in riverine, coastal, and special floodplains (100-year recurrence interval) shall be considered unsuitable unless, after consultation with Geological Survey, the surface management agency determines that all or certain stipulated methods of coal mining can be undertaken without substantial threat of loss to people or property, and to the natural and beneficial values of the floodplain on the lease tract and downstream."

This criterion does not apply to UAA 1. Lack of information prevents complete assessment of UAA 2 under this criterion.

Criterion Number 17 - "Federal lands which have been committed by the surface management agency to use as municipal watersheds shall be considered unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are listed as municipal watersheds.

Criterion Number 18 - "Federal lands with National Resource Waters, as identified by states in their water quality management plans, and a buffer zone of Federal lands ¼ mile from the outer edge of the far banks of the water shall be unsuitable."

This criterion does not apply to either area of the KRCRA on the Forest. No such areas are identified as National Resource Waters.

Criterion Number 19 - "Federal lands identified by the surface management agency, in consultation with the state in which they are located, as alluvial valley floors according to the definition in Section 3400.0-5(a) of this title, the standards in 30 CFR Part 822, the final alluvial valley floor guidelines of the Office of Surface Mining Reclamation and Enforcement when published, and approved state programs under the Surface Mining Control and Reclamation Act of 1977, where mining would interrupt, discontinue, or preclude farming, shall be considered unsuitable".

This criterion does not apply to UAA 1. UAA 2 (Figure 7) contains lands identified as alluvial valley floors to which this criterion applies. Lack of information prevents identification of lands outside alluvial valleys to which this criterion would apply. Alluvial valley floors under this criterion are unsuitable for mining.

There are no exceptions to this criterion.

Finding: Alluvial valley floors to which this criterion applies are considered to be unsuitable for any coal mining activities (6,360 acres). Lack of information prevents identification of lands outside alluvial valleys which would be unsuitable under this criterion. Unless other criteria apply, all other KRCRA areas on the Forest are suitable for any coal mining activities.

Criterion Number 20 - "Federal lands in a state to which is applicable a criterion (i) proposed by that state, and (ii) adopted by rulemaking by the Secretary, shall be considered unsuitable."

The State of Colorado has not developed unsuitability criteria for Federal lands; therefore, this criterion does not apply to either UAA 1 or 2.

MAP OF UNSUITABILITY ASSESSMENT AREA 2 SHOWING LANDS AFFECTED BY CRITERION 19

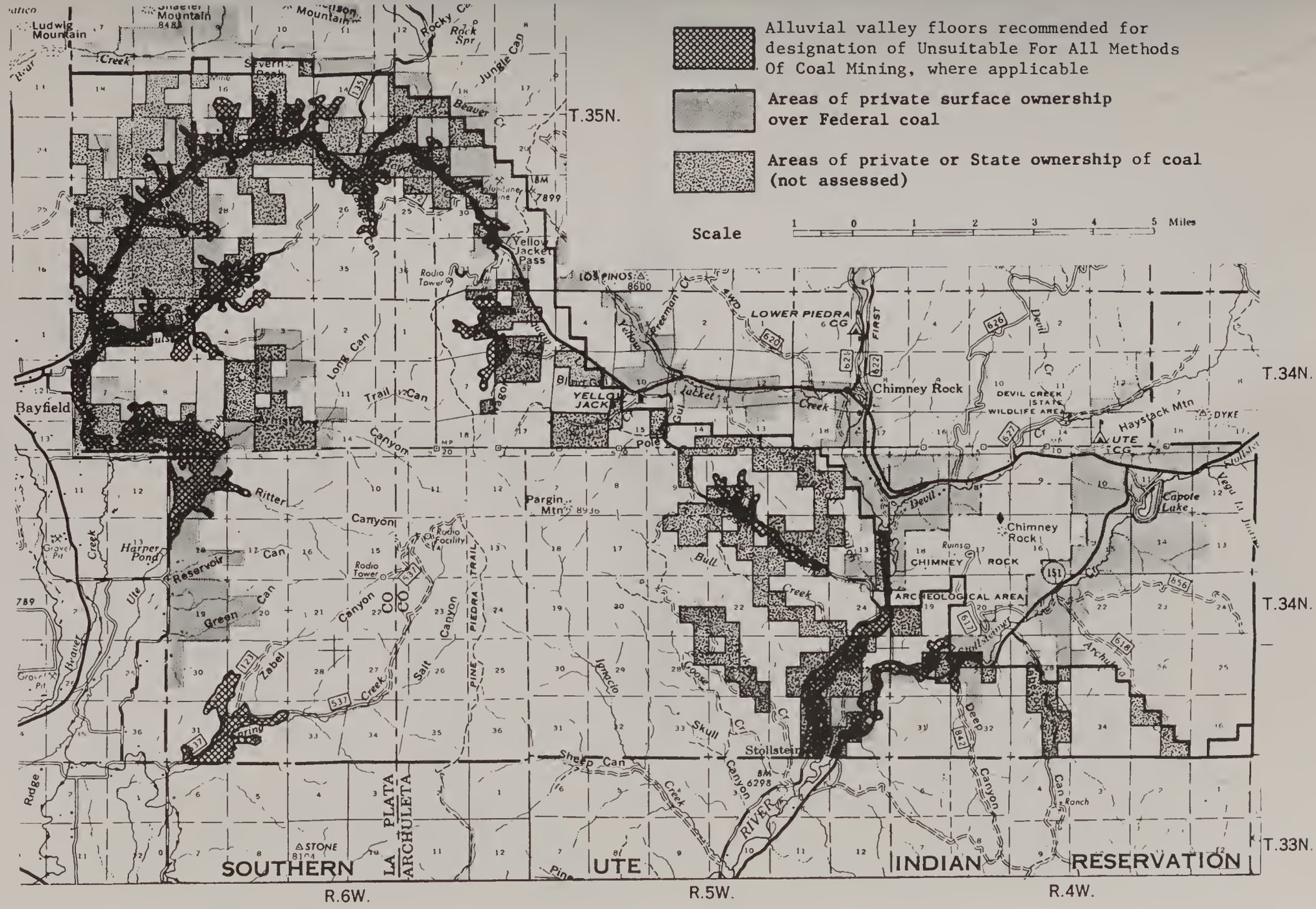


FIGURE 7

APPENDIX J

DETERMINATION OF ANIMAS AND SAN JUAN RIVERS FOR WILD AND SCENIC RIVER ELIGIBILITY

DETERMINATION OF ANIMAS AND SAN JUAN RIVERS FOR WILD AND SCENIC RIVER ELIGIBILITY

INTRODUCTION AND PURPOSE

Each Forest involved in the development of its Land and Resource Management Plan has been directed to make an evaluation of Wild and Scenic River potential for selected rivers. The selected rivers were identified by a Nation-wide inventory conducted by Heritage Conservation and Recreation Service (HCRS).

The San Juan National Forest contains two inventoried rivers; the San Juan River and the Animas River. The rivers, as inventoried, provide the following general descriptions:

> San Juan River: From its juncture with Fourmile Creek upstream to the headwaters of its East and West Forks.
>
> Animas River: From old Animas City upstream to its juncture with Mineral Creek, just north of Silverton.

The evaluation of these rivers is a two-step process:

1. Inventory the physical aspects of the river.

2. Evaluate the river for eligibility for inclusion into the National Wild and Scenic Rivers System. Criteria to be used is found in Public Law 93-621 as amended, the U.S.D.I. - U.S.D.A. guidelines adopted in February 1970, and the supplemental guidelines developed for the National Study of the Piedra River in 1976-77.

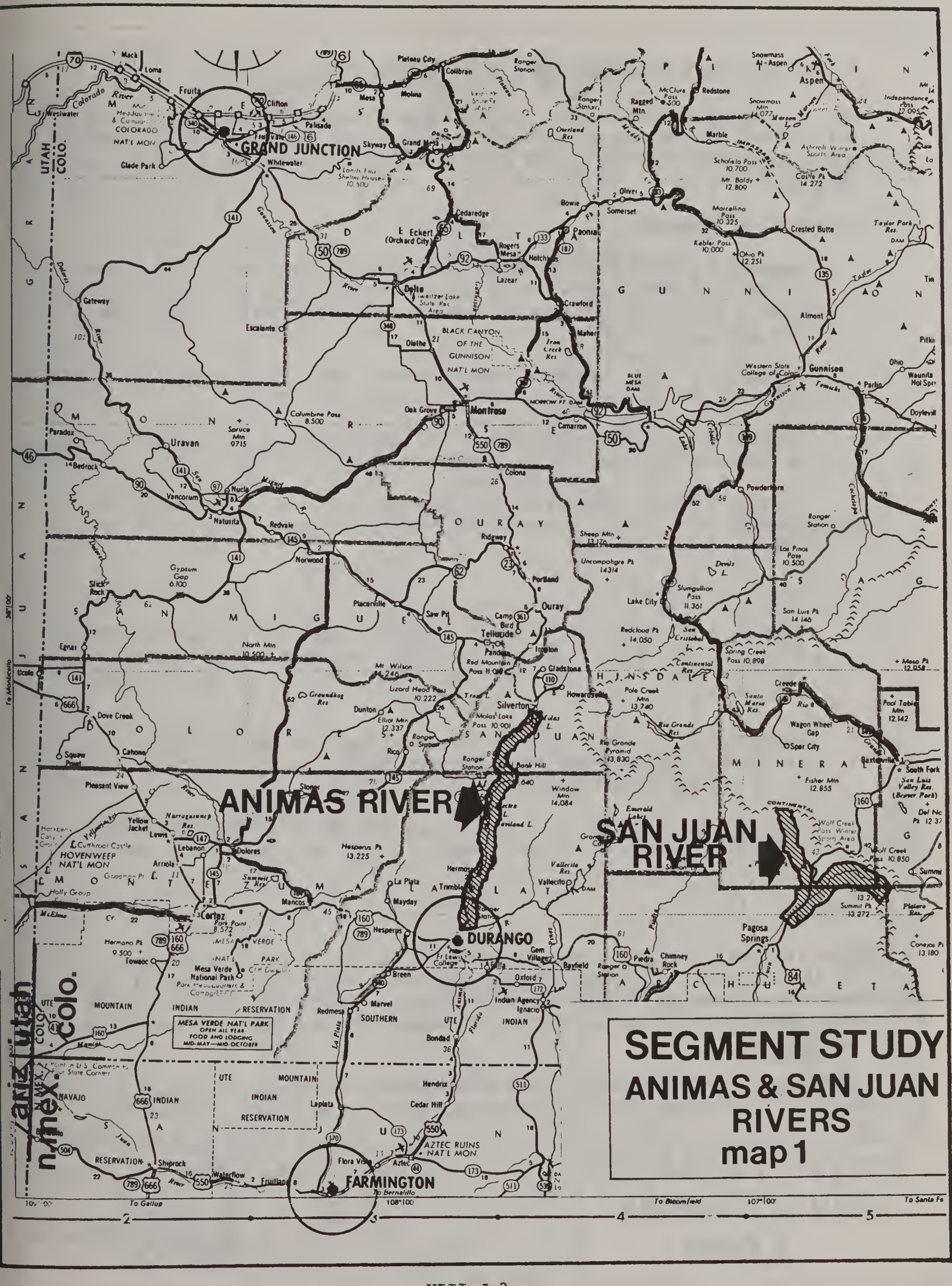
This Appendix first identifies specific information about each of the rivers and compares the information against eligibility criteria. It concludes with a summary of the assessment and the determinations of eligibility for each of the rivers.

RIVER INFORMATION AND ASSESSMENT

LOCATION OF RIVERS

The San Juan River is located on the east side of the San Juan National Forest in the Pagosa Human Resource Unit (HRU). Its West Fork originates along the Continental Divide in Mineral County and joins with the East Fork in Archuleta County to form the mainstream which is entirely located in Archuleta County. The East Fork originates along the Continental Divide in Archuleta County, thence flows through a portion of Mineral County and then returns to Archuleta County.

The portion of the Animas being studied is located in the center of the San Juan National Forest in the Animas HRU. The approximate upper one-half is in San Juan County and the lower portion is in La Plata County. Locations of the rivers are shown on Map 1.


ANIMAS RIVER
SAN JUAN RIVER
DURANGO
FARMINGTON
GRAND JUNCTION
MONTROSE
OURAY
SILVERTON
TELLURIDE
DELTA
GUNNISON
CRESTED BUTTE
ASPEN
MESA VERDE NAT'L PARK
OPEN ALL YEAR
FOOD AND LODGING
MID-MAY—MID-OCTOBER
AZTEC RUINS NAT'L MON.
HOVENWEEP NAT'L MON
BLACK CANYON OF THE GUNNISON NAT'L MON
SEGMENT STUDY
ANIMAS & SAN JUAN RIVERS
map 1

RIVER AREA STUDY BOUNDARIES

The rivers were segmented to distinquish distinct and significant differences in character, access, and level of development. The segments are identified below and also on Maps 2 (Animas River) and 3 (San Juan River).

Animas River Segments

Segment A -- The mainstream of the Animas River from the 32 Street bridge in Durango near old Animas City (S. 16 and 17, T.35N., R.9W., N.M.P.M.) upstream to Baker's Bridge (S. 24, T.37N., R.9W., N.M.P.M.).

Segment B -- The mainstream at Baker's Bridge upstream to the Rockwood Cut (S. 7, T.37N., R.8W., N.M.P.M.).

Segment C -- The mainstream of the Animas River at Rockwood Cut upstream to Elk Park (S. 17, T.40N., R.7W., N.M.P.M.).

Segment D -- The mainstream at Elk Park upstream to its confluence with Mineral Creek, one quarter mile south of Silverton (S. 19, T.41N., R.7W., N.M.P.M.

San Juan River Segments

Segment A -- The mainstream of the San Juan River from Fourmile Creek (S. 32, T.36N., R.1W., N.M.P.M.) upstream to the confluence of the East Fork and the West Fork (S. 12, T.36N., R.1W., N.M.P.M.).

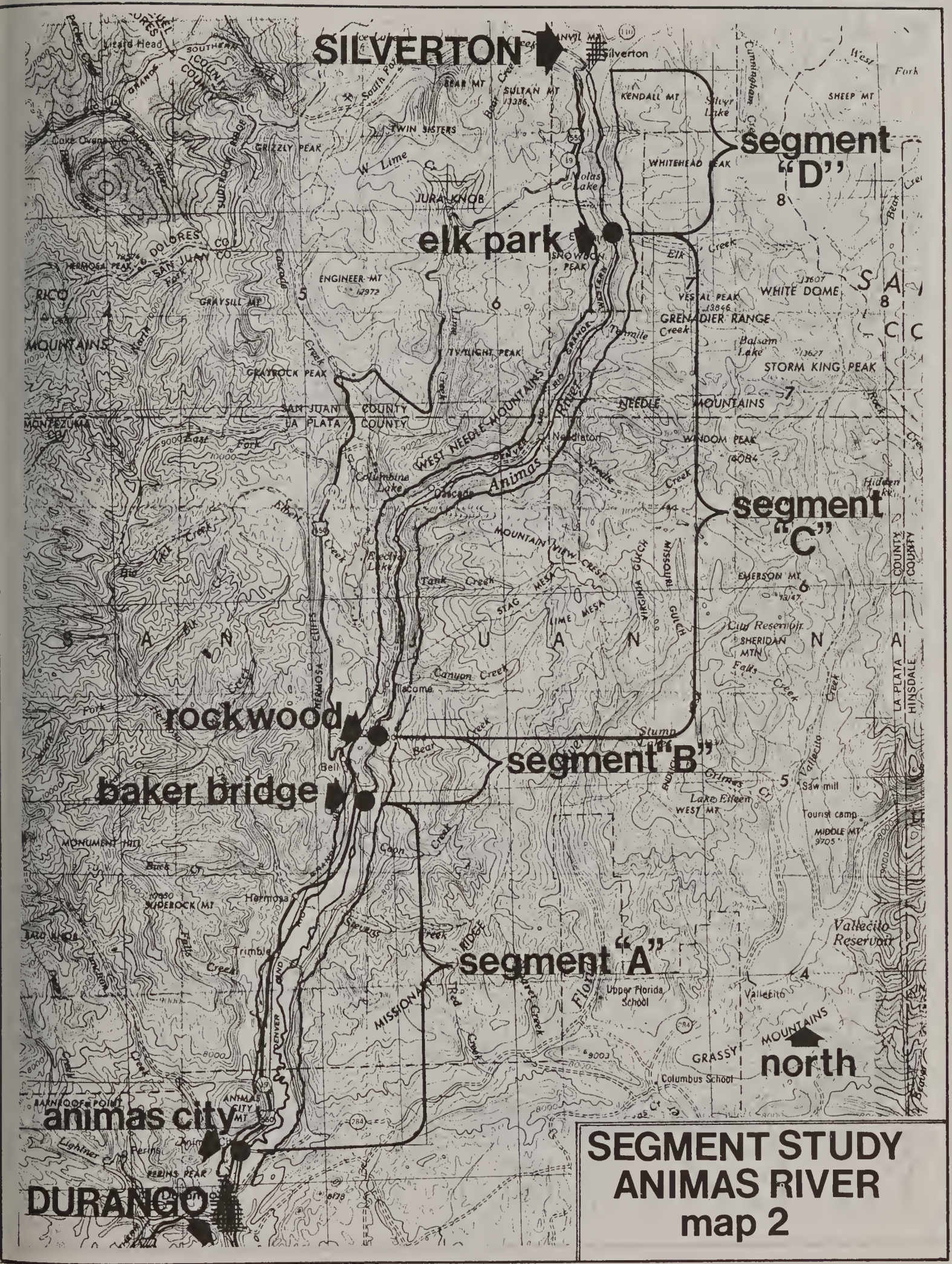
Segment B -- The West Fork of the San Juan from its confluence with the East Fork upstream to its origin along the Continental Divide (S. 4 and 5, T.38N., R.1W., N.M.P.M).

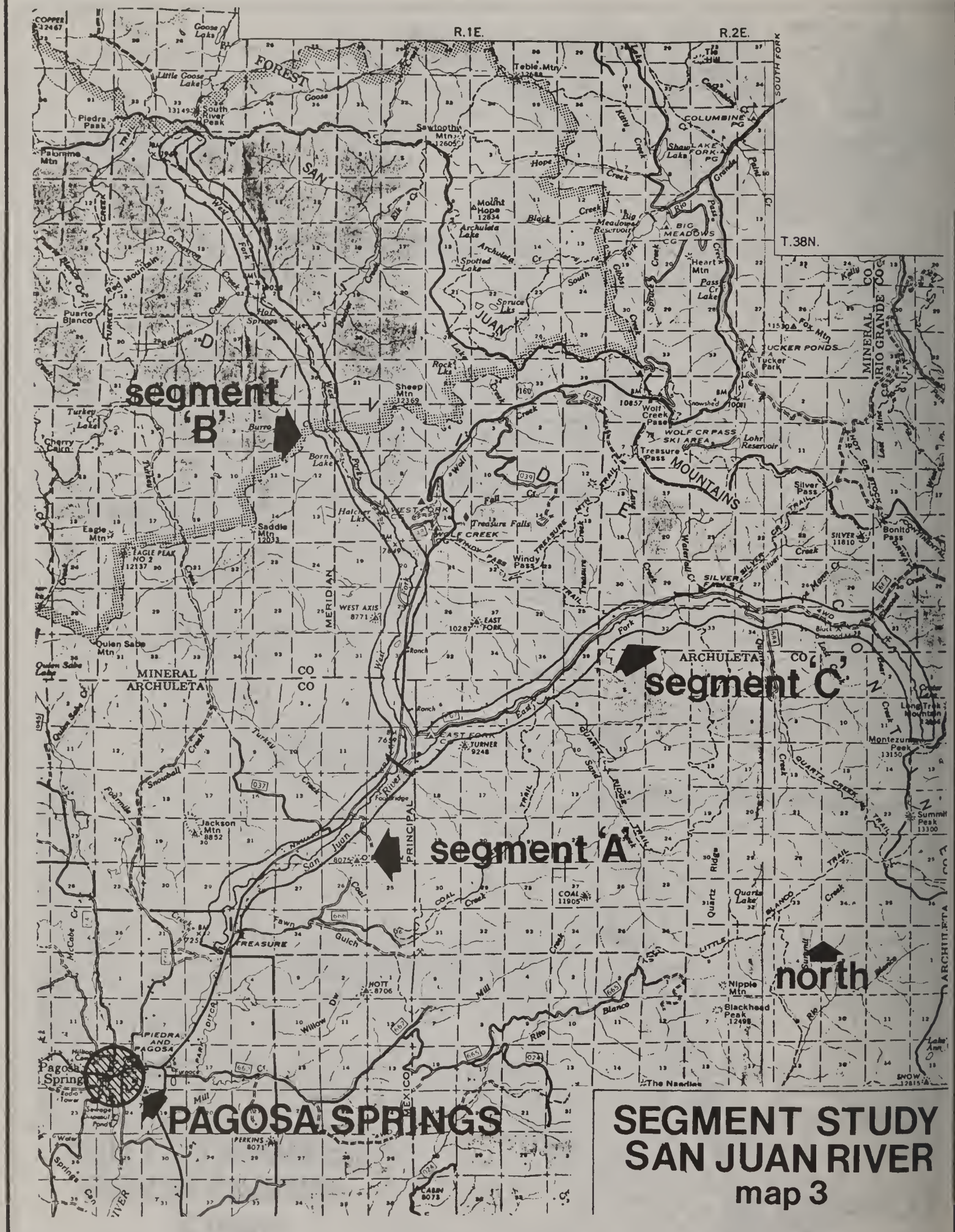
Segment C -- The East Fork of the San Juan from its confluence with West Fork upstream to its origin along the Continental Divide (S. 12, T.36N., R.2E., N.M.P.M.).

HISTORY

Both the San Juan and Animas Rivers have the history background common to the majority of Western United States. The first entries of the white man occurred for mining activities. This was followed by the settlement of small towns and establishment of the ranching industry in the 1880's.

The narrow gauge railroad up the Animas Canyon has been designated as a National Historical Site and is on the National Register of Historical Places.


SILVERTON
segment "D"
elk park
segment "C"
rockwood
segment "B"
baker bridge
segment "A"
animas city
DURANGO
north
SEGMENT STUDY
ANIMAS RIVER
map 2


R.1E.
R.2E.
T.38N.
segment 'B'
segment 'C'
segment 'A'
north
PAGOSA SPRINGS
SEGMENT STUDY
SAN JUAN RIVER
map 3

TRANSPORTATION

Area Transportation

Both the San Juan and the Animas Rivers are easily accessed through the existing transportation network. U.S. Highway 160 serves the area from east and west. U.S. Highway 550 serves the area from north and south along with U.S. Highway 84 and Colorado Highway 172. Commercial bus travel into the Durango and Pagosa areas exists. Both communities are served by airports. La Plata field near Durango can accommodate jet traffic up to DC-9's and 737's. Pagosa Springs Aviation at Pagosa can accommodate planes up to DC-4's and small corporate jets.

Corridor Transportation

Both rivers and their respective segments are well accessed by roads, trails, and the scenic Durango to Silverton railroad along the Animas. There is adequate access and transportation along the river segments except for the following situations.

1. The upper 9 miles of San Juan segment B is only served by trail since it is in the Wilderness.

2. The upper 3 miles of San Juan segment C is served only by game and livestock trails.

3. In the vertical-walled gorge of Animas segment B there are no trails or roads. The railroad does not go through this section.

LAND STATUS AND USE CLASSIFICATION

Table I displays the land status data for each segment of the rivers. A broad surface use classification is shown in Table II.

EXISTING DEVELOPMENTS

Each river segment has any number of uses that detract from the attributes of wild, scenic, or recreational rivers. When considered individually each use may have little or no significance. Collectively for any reach the consequences are cumulative. Table III displays facilities, improvements and developments within each segment of the Rivers.

TABLE I

Lands Data

	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Approximate Miles of River	6	16	15	16	4	22	5
Acres FS	570	3170	2550	---	430	4360	---
Acres BLM	---	---	---	---	---	1830	880
Acres PVT & Other	1350	1950	1250	5120	850	850	720
Total Corridor Acres	1920	5120	4800	5120	1280	7040	1600
% Public	31	62	74	---	34	88	55
% Private	69	38	26	100	66	12	45

TABLE II

Broad Surface Use Classification

Approximate Acres	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Subdivided Lands	800	500	---	2500	400	80	---
General Forest Type	570	3170	2550	---	600	4360	---
Agriculture and Pasturage	710	1450	1250	2620	280	---	---
Historic Mineral Area	---	---	100	---	---	2600	1600
Total	1920	5120	4800	5120	1280	7040	1600

TABLE III

Facilities, Improvements, Developments

Improvement or Structure	San Juan Segments			Animas Segments			
	A	B	C	A	B	C	D
Bridges (All)	2	5	3	3	---	5	2
High Density Subdivisions	3	2	---	5	---	1	---
Rural Homes and Ranches	Several	7	2	many	2	---	---
Fence Crossings	9+	10+	3	many	---	---	---
Gravel Operations	3	4	1	3	---	---	1
Mines (Abandoned or Active)	---	---	2	---	---	1	many
Commercial (Lodges, Stores, etc.)	2	3	---	many	---	2	---
Water Diversion Structures	8	22	4	many	---	---	---
Cfs Existing Water Rights	30.9	100.0	113.5	1784	---	---	---
Power Plants	---	---	---	---	---	1	---
Miles of RR Track	---	---	---	6	---	20	5
Miles of Parallel Paved Roads	6	4	---	13	---	---	2
Miles of Parallel Roads	2	4	13	many	---	---	3
Stream Modification (Channeling, riprap, etc.)	some	some	mod.	excess	---	mod.	excess

RESOURCES AND PHYSICAL SETTING

Table IV summarizes the physical character of the Rivers and their immediate corridors.

Geological Description

Geology of both the Animas and San Juan Rivers are described in many sources. The upper San Juan Basin has extremely diverse geology. However, the surface geology of the two rivers (and their segments) can be considered ordinary for rivers in southwestern Colorado. Table V is a summary of surface geology.

TABLE IV

Physical Character

Attribute	San Juan Segments A	B	C	Animas Segments A	B	C	D
Surface Geology No. of geological periods represented.	3	2	2	1	1	2	3
Slope Dissection	Low	Mod	Mod	Low	Low	High	High
Valley Shape-Gorge(G, U,V)	U	Mix	V	U	G	V	V
Cliff Features	None	Mod	Mod	None	High	High	High
Vegetation Variation	Mod	Mod	Low	Low	Mod	High	Mod
Variation in Water Form	Low	Mod	Mod	Low	High	High	High
Large Rapids or Falls	None	Few	Many	None	Many	Many	None
Variety of Recreation Uses-Water	Few	Few	Few	Few	Few	Few	Few
Land	Few	Mod	High	Few	Few	High	High
Fisheries*	Poor	Good	Good	Poor	Poor	Poor	None
Wildlife Animals	Fair	Good	Excel.	Poor	Poor	Poor	Poor
T & E Species	No	Maybe	Maybe	No	No	No	No
Unusual Abundance Unique Associations	No	No	No	No	No	No	No
Cultural Values** Historic	No	No	No	Yes	Yes	Yes	Yes
Prehistoric	No	No	No	No	No	No	No

* Fisheries are discussed in more detail in Exhibits 1 and 2 at the end of this Appendix.

**This is a tabulation of cultural properties on the state or national register.

TABLE V

Surface Geology (Lower to Upstream)

River Segment	Formation	Geologic Period
	Animas River	
A	Alluvial Deposits	Quaternary
B	Baker's Bridge Granite	Precambrian
C (1)	Irving Formation	Precambrian
(2)	Alluvial Deposits	Quaternary
(3)	Electra Lake Gabbro	Precambrian
(4)	Irving Formation	Precambrian
(5)	Alluvial Deposits	Quaternary
(6)	Twilight Gneiss	Precambrian
(7)	Irving Formation	Precambrian
(8)	Alluvial Deposits	Quaternary
(9)	Tenmile Granite	Precambrian
(10)	Glacial Drift	Quaternary
(11)	La Jara Canyon Tuff	Tertiary
(12)	Irving Formation	Precambrian
(13)	Alluvial Deposits	Quaternary
(14)	Uncompahgre Formation	Precambrian
D (1)	Alluvial Deposits	Quaternary
(2)	Uncompahgre Formation	Precambrian
(3)	Irving Formation	Precambrian
(4)	Intrusive (Oligocene)	Tertiary
(5)	Alluvial Deposits	Quaternary
	San Juan River	
A (1)	Lewis Shale	Upper Cretaceous
(2)	Glacial Drift	Quaternary
(3)	Alluvial Deposits	Quaternary
B (1)	Alluvial Deposits	Quaternary
(2)	Volcaniclastic Facies	Tertiary
(3)	Fish Canyon Tuffs	Tertiary
(4)	Huerto Formation	Tertiary
(5)	Bachelor & Carpenter Tuffs	Teriary
(6)	Table Mountain Volcanics	Tertiary
C (1)	Glacial Drift	Quaternary
(2)	Volcaniclastic Facies	Tertiary
(3)	Telluride Conglomerates	Tertiary
(4)	Alluvial Deposits	Quaternary
(5)	Blanco Basin Formation	Tertiary
(6)	Volcaniclastic Facies	Tertiary

Visual Description

The segments of the Animas River included in this assessment are renowned for their spectacular mountain scenery. This scenery is the major reason for increasing the already high recreation visitation. Aesthetically, the zone includes some of the most diverse and dynamic landscapes in the Colorado Rocky Mountains. There is remarkable physical variety in the segments, starting from the high alpine valley in the north through the Animas River gorge of vertical canyon walls to the broad alluvial valley in the south of the Animas Valley.

The San Juan River segments under consideration have some diverse and dynamic landscapes that are typical to the Southern Colorado Rockies. The area encompasses the open pastoral valley of the lower portion to the high alpine landscapes of the Continental Divide. In the area, there is outstanding diversity in the landscape elements of landform, water form, and vegetation. Also, there are segments that have a moderate degree of diversity in these elements or high visual impacts from man's activities and would not be particularly outstanding in visual quality.

Water Resources

Exhibits #1 and 2 at the end of this Appendix provide detailed analyses of water quantity and quality for the Animas and San Juan Rivers respectively. Following is a brief summary:

Quality - The Animas River does not meet the minimum quality standards of both Federal and State criteria, particularly from a chemical standpoint.

The San Juan River not only meets standards, but exceeds the criteria in most instances.

Quantity - The average annual flow of the Animas River is 645,000 acre-feet at the Colorado-New Mexico state-line. There are 1784 cfs of existing water rights for irrigation and domestic purposes.

The average annual flow of the San Juan River is 482,000 acre-feet at Colorado-New Mexico state line. There are 257 cfs of existing water rights from the River for irrigation and domestic purposes.

There are no major impoundments on either river. Both rivers have numerous diversion structures for irrigation purposes, particularly in those portions running through private lands.

Wildlife

Wildlife on both rivers consist of the many species common to the Rocky Mountains. On neither river is the river corridor the prime or major habitat for big game species.

ASSESSMENT SUMMARY AND DETERMINATIONS OF ELIGIBILITY

Table VI is a summary of how each river segment meets eligibility requirements. The summary does not weight the criteria nor does it express that any subjective values are more or less important. The summary is based upon the collective intent of the criteria combining those of the legislation and those developed by USDI-USDA.

TABLE VI

Summary of How River Segments Meet Eligibility Criteria

Criteria	San Juan Segments A	B	C	Animas Segments A	B	C	D
Free Flowing	no	no	no	no	yes	yes	no
Length	no	no	no	no	no	yes	no
Water Quantity	no	yes	yes	yes	yes	yes	yes
Water Quality	yes	yes	yes	no	no	no	no
Outstanding Remarkable							
Scenery	no	no	no	no	yes	yes	no
Recreation	no	no	no	no	no	yes	yes
Geology	no	no	no	no	yes	yes	yes
Fish and Wildlife	no	yes	yes	no	no	no	no
Cultural Values	no	no	no	no	yes	yes	yes

Neither the Animas River nor the San Juan River is considered to be eligible for Wild and Scenic River classification. Following is a brief narrative of why specific segments were not found to be eligible.

SAN JUAN RIVER

San Juan Segment A

This segment and its corridor has been highly modified through land subdivision and gravel dredging operations for most of its length. The segment has numerous fence crossings and several water diversions which detract from water quantity. The segment neither meets the criteria of "outstandingly remarkable" nor does it meet that of length.

San Juan Segment B

The West Fork of the San Juan on its lower reaches is in the same condition as the mainstream. The upper portion within the Weminuche Wilderness does not have any development except for a recreational trail but lacks the "outstandingly remarkable" character as stated by the law. Because the unmodified portion of this river is only nine miles long and lacks outstanding values, it does not appear to meet the spirit and intent of Public Law 90-542 as amended.

San Juan Segment C

This segment does not meet the criteria of length. It contains approximately 1½ miles on private land in the middle of the segment that has been severely altered by bulldozed channelization. Therefore, the segment lacks the "outstandingly remarkable" character.

ANIMAS RIVER

Animas Segment A

This segment has been highly modified by subdivisions, gravel operations and fences. For most of its length it is lined with old car bodies or downed cottonwood trees cabled to anchors on the adjoining agriculture lands. Water quality does not meet minimum requirements of Federal or State criteria. It lacks "outstandingly remarkable" character.

Animas Segment B

This short segment does not meet the criteria of length. Water quality does not meet minimum requirements of Federal and State criteria.

Animas Segment C

This segment does not meet the minimum requirements of water quality of Federal and State criteria. It contains stream modification due to extensive riprap and cribbing structures to protect the railroad bed.

Animas Segment D

This short segment does not meet the criteria of length and is considered a dead river because of chemical pollution from past mining operation. The channel has been modified in several places. The aesthetics of the river are marred by iron oxide stains from the high waterline down to the present water level.

In all Animas River segments, the water quality is deemed so bad that it could not be restored without the cost of millions of dollars. The Colorado Division of Wildlife does not stock the Animas River throughout the segmented area. This indicates the lack of a suitable fishery. The severity of the violation of the water quality criteria overrides the other values of wild and scenic river classification.

EXHIBIT 1

WILD AND SCENIC RIVER ELGIBILITY REPORT
ANIMAS RIVER
WATER QUALITY AND FISHERIES, WATER FLOWS, AND FLOODPLAINS

The objectives of this report are to 1) present information required for the Animas Wild and Scenic River Eligibility Analysis for the San Juan National Forest Management Plan, and 2) to evaluate the water quality of the river in regard to water quality criteria for eligibility for Wild and Scenic River classification.

WATER QUALITY

Guidelines written for evaluating Wild and Scenic Rivers (USDA, USDI; 1970) state that all rivers included within the National Wild and Scenic River System should meet the "Aesthetics - General Criteria" as defined by the National Technical Advisory Committee on Water Quality in the Federal Water Pollution Control Administration's Water Quality Criteria, (WQC), April 1, 1968. Water quality should meet the criteria for fish, other aquatic life, and wildlife so as to support the propogation of those forms of life which normally would be adapted to the habitat of the stream.

The WQC, 1968 water quality/requirements include:

Aesthetics

General Requirements

1. All surface waters should support life forms of aesthetic value.

2. Surface waters should be free of:

   a. Materials that will settle to form objectionable deposits.

   b. Floating debris, oil, scum, and other matter.

   c. Substances producing objectionable color, odor, taste, or turbidity.

   d. Toxic materials which produce undesirable physiological responses in humans, fish, and other animal life and plants.

   e. Substances which produce undesirable aquatic life.

EXHIBIT 1 (continued)

Fish, Other Aquatic Life, and Wildlife

Parameter	Standard
pH	6-9
TDS	Below 1 500 mg/l
Total acidity	Should not lower alkalinity to below 20 mg/l
°F	Should not be raised above 5°F above normal
Dis. Oxygen	Above 6 mg/l
CO_2	Below 25 mg/l
Oil	No surface oil films, odors, or deposits
Turbidity	Below 10 JTU from waste discharges
Settleable materials	Should not inhibit flora
Floating materials	Foreign origin excluded
Tainting	Should not taint fish or invertebrates
Radionuclides	USPHS Drinking H_2O stds.
Total P	Below .1 mg/l

Water quality data which was available for the Animas River between Silverton and Durango is displayed in Table 1-1. The Colorado Department of Health, Water Quality Control Commission will be establishing water quality standards for all streams in the San Juan - Dolores River Basins, in 1981, including the Animas River. Proposed Colorado Water Quality Control Division standards (being considered by the Commission) are listed in Table 1-1. The WQC (1968) criteria for physical and biological parameters can be supplemented with inorganic and metal parameters from the Colorado Department of Health. The inorganic and metal parameters can be used to address the WQC 1968 category of toxic materials "which produce undesirable physiological responses in humans, fish, and other animal life and plants." Frequent violations of the metal standards, particularly lead, manganese, zinc, and iron can be observed at all stations (four at Silverton, two at Baker's Bridge, two at Durango). Heavy metal pollution from mine discharges and milling operations in the Animas River drainage above Silverton is well documented (Wentz, 1974; Wuerthele, 1975; Smith, 1976, Woodling, 1977). Several mine acid discharges are heavily impacting the Animas River and tributaries. In June of 1978, the bottom of Lake Emma fell into Standard Metals workings and polluted water from the American and Terry tunnels reached the Animas River, a disaster which had severe water quality effects for at least six months (WQCD, 1981).

As a result of these past and present activities, water quality of the Animas River from Silverton to Elk Park (seven miles downstream) is extremely degraded. Aquatic invertebrate inventories (Wentz, 1974) Smith, 1976) in the Animas River at and above Silverton found no aquatic

TABLE 1-1

Animas River, Water Quality Analysis, Wild and Scenic River Evaluation

Parameter	Prop.Colo.D. of Health Standards Source to Molas Cr..	Prop.Colo.D of Health Standards Molas Cr.to Durango	WQC 1968	Colo.D.Health (Smith, 1976) Animas @ Silverton		Colo.D.Health 1980 data Animas @ Silverton		Colo.D.Health (Smith, 1976) Baker's Bridge		Colo.D.Health 1978-1980 Baker's Bridge RR		Wuerthele 1975 Bridge below Silverton		Wuerthele 1975 Durango KOA		Wentz 1971 @ Silver-ton	Bur. of Rec. 1977-1978 @ Durango	
phy & bio				mean	range	mean	range	mean	range	mean	range	Smp#1	Smp#2	Smp#1	Smp#2		mean	range
Dis.Oxygen	6.0	6.0	6.0	7.7	4.5*-10		7.5-13.8	9.1	5*-13		7.7-10.8	8.3	7.6	7.5	7.5		8	7.8-11
pH	6.5-9	6.5-9	6-9	7.7	6.3*-9		7-8.2	7.9	6.9-8.9		6.3-8.4	5.8*	6.9	4.9*	7.3	7.9	7.8	7.1-8.7
Temp°C	20°C	20°C	20°C	5.8	0-14		4-14	5.9	0-16.1		1-14	12	11	13	13	11		
Fecal Coliform							3-9				23-93							
inorganic																		
NH_3	.02	.02		.2	0-1.3*	.003	-.062*	.05	0-.72*		.001-.004	.3*			1.6*			
NO_3^2	.05	.05						.002	0-.009									
NO_3	10	10		.3	0-1.5		.16-5	.1	0-.8									
Boron		.75		.034	0-.22	.001	.0067	0-.08			.023						.158	.124-.184
Chloride		250		4.7	2-8		4-12				3-12	2	2	4			19	.4-46.4
Sulfate		250		193	47-367*		30-210	87.2	25-139		21-140	90	190	135	230		114	18-212
metals																		
Arsenic	.05	.05					.001-.005	0			.005					.005	.004	.003-.005
Cadnium	.004	.001		.0019	0-.005*			.0002	0.003		.001-.002			.002				
Chromium	.1	.1						0										
Copper	.005	.035		.0092*	0-.110*	.021	.009-2.1			.0016	.007-.036*			.01			.012*	.009-.018
Lead	.004	.085		.009*	0-.06*	.072*	.006*-.460	.016	0-.03	.014*	.009*-.16*			.01*			.001	.001
Manganese	.05	.05		.0071	.003-.012*	.485*	.220*-1.5*	.186*	.05-.8*		.25*-.77*			3.3*			.13	.076*-.203*
Mercury	.00005	.00005						.0002*	0-.0005*							.0002*	.001*	0-.002*
Nickel	.05	.1														.002	.006	.001-.021
Selenium	.05	.05						0									.002	.001-.004
Silver	.00001	.00001					.0007*	0										
Zinc	.05	.3		.774*	0-2.02*	.497*	.3*-.8*	.120*	0-.55*							.5*		
Iron	.3	2.0		.904*	.1-6.3*	.642*	.25*-2.1*	.370	.05-1.2		.1-3.1*					.02		

*Water Quality Standard Violation

insects in riffle or pool areas (mayflies, stoneflies, caddisflies, beetle larvae, black flies, dragonflies, true flies). The rock substrate in the area is stained yellowish-orange from precipitates of iron hydroxide ($Fe(OH)_3$ and iron sulfate ($FeSO_4$), both products of pyrite oxidation, common in mine acid drainage (Wentz, 1974). These precipitates can be considered "objectionable deposits," and violate the "aesthetic - general requirements" (WQC, 1968).

Dilution from inflow of high quality tributary streams below Elk Park (Elk Creek, Tenmile Creek, Noname Creek, Ruby Creek, Needle Creek, Cascade Creek) gradually improves water quality in the Animas River so that by Baker's Bridge (about 12 miles above Durango) at the mouth of Animas Canyon, water quality is greatly improved. Water quality standards violations of ammonia, copper, lead, manganese, mercury, zinc, and iron are still consistently observed at Baker's Bridge (Table 1-1). Bureau of Reclamation monitoring at Durango (1977 and 1978) detected metal standard violations of copper, manganese, and mercury; Wentz (1971) reports zinc concentrations at Durango at ten times above 1981 Colorado standards (Table 1-1).

Terry and Adams (1979) report a heavy metal toxicity problem in the Animas River at the 32nd Street bridge in Durango. Bioassary tests of adding nitrogen and phosphorous to Animas River water samples from Durango and measurements of low algae growth response indicate that high metal concentrations, particularly zinc, severely limit the primary productivity of the Animas River (Terry and Adams, 1979). The lack of algae or other aquatic vegetation is notable in the Animas from the headwaters downstream through Durango.

Aquatic invertebrate samples at Baker's Bridge, 32nd Street bridge, and near the Holiday Inn (Durango) indicate increasing numbers and diversity of organisms at these stations although the aquatic insect populations are low compared to similar Colorado streams (Smith, 1976).

In summary, water quality degradation from mining activity above Silverton has significantly impacted the Animas River from Silverton through Durango. The River does not meet many of the WQC, 1968 or proposed Colorado Department of Health criteria which serve as a basis from which to judge the River's eligibility for Wild and Scenic River designation.

FISHERIES

Fish shocking and creel census data for the Animas River from Silverton to Durango is extremely limited. The following conclusions can be drawn from examination of fisheries information by Smith (1976):

1. Overall, the Animas from Silverton to Durango is a poor - mediocre rainbow trout fishery.

2. The Animas River fishery above Silverton is limited to a small population of stocked rainbows in a 2.5 mile segment between Howardsville and the Standard Metals Mill (2 miles above Silverton).

3. Between the Standards Metals Mill through Silverton to Elk Park, the river is a non-fishery and probably basically dead due to "highly mineralized water, large mineralized salt and oxide deposits, and excess tailings covering the bottom strata."

4. The area from Elk Park to Baker's Bridge will support fish with only limited success between Needleton and Elk Park.

5. A fair fishery exists between Baker's Bridge and Durango with most of the game fish being rainbows, although browns and a few cutthroat and brook trout were sampled.

6. Animas River fish population estimates are extremely low with respect to the size of the river and the non-game fish populations are slightly higher than normal.

7. Poor-good rainbow-brown, or rainbow-brook-cutthroat trout fisheries occur in many of the tributary streams to the Animas. Most of the Animas tributaries above Silverton are non-fisheries due to mine acid drainage and toxic tailings substrate deposits.

Bill Wyler (Montrose) and Mike Japhets (Durango), Fishery Biologists with the Colorado Division of Wildlife (contacted by phone; 6/29/81) reaffirmed that no fishshocking and very little creel census data is available from Silverton to Baker's Bridge. Both felt that the fishery in this river segment is probably quite limited due to steep gradient and poor water quality. Wyler mentioned that some excellent pool habitat exists within the canyon which could support good fish populations with improved water quality.

In summary, the fisheries resource in the Animas River from Silverton to Durango reflects the water quality, improving from non-existent to poor-fair, and cannot be considered a high quality fishery.

FREE FLOWING CHARACTERISTICS

The Wild and Scenic Rivers Act provides that a river must be in a free flowing natural condition to be eligible for inclusion in the Wild and Scenic Rivers system. The USDA/USDI (1970) Guidelines define free flowing as "without impoundment, diversion, straightening, riprapping or other modification of the waterway." The Guidelines further state that "low dams, diversion works, and other minor structures will not automatically preclude the river unit from being included in the National Wild and Scenic Rivers System, providing such structures do not unreasonably diminish the free flowing nature of the stream and the scenic, scientific, geological, historical, cultural, recreational, and fish and wildlife values present in the area."

No impoundments occur on the Animas River. According to Biff Stransky and Wayne Dunn, Animas Ranger District, no diversions occur in the Animas River Canyon. A few minor diversions (irrigation ditches and pipes) occur between Baker's Bridge and Durango. Minor riprap exists in a few places within the Animas Canyon to protect the narrow gauge railroad from high water flows. A large riprap project occurred at Elk Park in 1978 to protect the railroad from a meandering segment of the Animas (2520, 9/14/78).

Below Baker's Bridge, the amount of riprap and river straightening increases, particularly at the gravel pits below Trimble Lane. In several places used car bodies, rocks, and concrete blocks have been dumped along the stream banks to reduce channel erosion. Although the car bodies, rocks, and concrete blocks do not "unreasonably diminish the free flowing nature of the stream." They do have a high visual impact when viewed from the River.

In summary, the Animas River can be considered a free flowing river from Silverton to Durango.

STREAMFLOWS

The USDA/USDI (1970) Guidelines provide that for a river to be eligible for Wild and Scenic River designation, "there should be sufficient volume of water-related outdoor recreation activities generally associated with comparable rivers."

Average annual discharge of the Animas River at the Colorado-New Mexico state line (approximately 25 miles south of Durango) is 645,000 acre-feet. Using U.S.G.S. streamflow gauging stations on the Animas, 7 day - 10 year low flow calculates to be 10.7 cfs at Howardsville, 65.2 cfs above Tacoma, and 125.7 cfs at Durango (Hook, 1975). Peak flows on the Animas are generally associated with snowmelt runoff (usually 3,000 to 8,000 cfs at Durango in June) although the largest flood on record (25,000 cfs at Durango in October, 1911) resulted from a massive frontal rain storm.

The most frequent recreational use of the Animas River between Durango and Silverton is scenic viewing passengers riding the Durango to Silverton narrow gauge railroad. Limited fishing and floating occur through these segments although considerable fishing and floating occurs in and below Durango.

Due to no significant diversions from the Animas in the Silverton to Durango segment and sufficient low flow characteristics, the river provides sufficient water flows during a normal year to provide full enjoyment of the limited water-related outdoor recreation.

FLOODPLAIN

Floodplain characteristics of the Animas River and major tributaries in the Hermosa-Durango area are delineated in two Army Corps of Engineer Flood Hazard Information reports (Dept. of Army, 1977). The Standard Project Flood (one that may be expected from the most severe combination of hydrometerological conditions, usually about 500 years) from Baker's Bridge to Durango occupies a floodplain from the East Animas Road to Highway 550 (about two miles wide). At Durango, just below the 32nd street bridge, the stream channel gradient sharply increases and the standard Project Flood is confined to the existing channel and immediate area (about 500 feet wide). Although no floodplain mapping has been done for the Animas Canyon, the narrow steep gradient will confine even the standard Project Flood to the immediate channel area except for the few low gradient river sections within the Canyon (such as Elk Park) where the flood will spread out several hundred feet wide.

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EXHIBIT 2

WILD AND SCENIC RIVER ELIGIBILITY REPORT
SAN JUAN RIVER
WATER QUALITY AND WATER FLOWS

The objectives of this report are to 1) present information required for the San Juan Wild and Scenic River Eligibility Analysis for the San Juan National Forest Management Plan, and 2) to evaluate the water quality of the river in regard to water quality criteria for eligibility for Wild and Scenic River classification.

WATER QUALITY

Guidelines written for evaluating Wild and Scenic Rivers (USDA, USDI; 1970) state that all rivers included within the National Wild and Scenic River System should meet the "Aesthetics - General Criteria" as defined by the National Technical Advisory Committee on Water Quality in the Federal Water Pollution Control Administration's Water Quality Criteria, April 1, 1968. Water quality should meet the criteria for fish, other aquatic life, and wildlife so as to support the propogation of those forms of life which normally would be adapted to the habitat of the stream.

The WQC, 1968 water quality/requirements include:

Aesthetics

General Requirements

1. All surface waters should support life forms of aesthetic value.

2. Surface waters should be free of:

   a. Materials that will settle to form objectionable deposits.

   b. Floating debris, oil, scum, and other matter.

   c. Substances producing objectionable color, odor, taste, or turbidity.

   d. Toxic materials which produce undesirable physiological responses in humans, fish, and other animal life and plants.

   e. Substances which produce undesirable aquatic life.

EXHIBIT 2 (continued)

Fish, Other Aquatic Life, and Wildlife

Parameter	Standard
pH	6-9
TDS	Below 1 500 mg/l
Total acidity	Should not lower alkalinity to below 20 mg/l
°F	Should not be raised above 5°F above normal
Dis. Oxygen	Above 6 mg/l
CO_2	Below 25 mg/l
Oil	No surface oil films, odors, or deposits
Turbidity	Below 10 JTU from waste discharges
Settleable materials	Should not inhibit flora
Floating materials	Foreign origin excluded
Tainting	Should not taint fish or invertebrates
Radionuclides	USPHS Drinking H_2O stds.
Total P	Below .1 mg/l

Available water quality for the San Juan River is displayed in Table 2-1. The Colorado Department of Health, Water Quality Control Commission will be establishing water quality standards for all streams in the San Juan-Dolores River Basins, in 1981, including the San Juan River. Proposed Colorado Water Quality Control Division standards (being considered by the Commission) are listed in Table 2-1. The WQC (1968) criteria for physical and biological parameters can be supplemented with inorganic and metal parameters from the Colorado Department of Health. The inorganic and metal parameters can be used to address the WQC 1968 category of toxic materials "which produce undesirable physiological responses in humans, fish, and other animal life and plants."

The San Juan River has excellent water quality. No violations of physical and biological parameters have been measured except for a 21.5° C water temperature reading at Pagosa in August 1980. Dissolved nitrogen constituents are considerably below standard (Table 2-1). Wuerthele (1975) reports total phosphorous readings taken in 1974 in the .02 to 0.4 range in the West Fork and main stem. The WQC (1968) states that to prevent nuisance algae growth "as a guideline, the concentration of total phosphorus should not be increased to levels exceeding .1 mg/l in flowing streams." No nuisance algae growth have been observed in the San Juan River. The moderately high total phosphorous readings on the West Fork could possibly be attributed to pasture management activities (grazing and irrigation return flows) on private lands on the West Fork (below West Fork Campground) and on the main stem of the San Juan River. Walt Werner (District Ranger, Pagosa Ranger District) mentioned that fertilization occurs on some of the private lands on the West Fork in

TABLE 2-1

San Juan River, Water Quality Analysis, Wild and Scenic River Evaluation

Parameter	San Juan R & E&W Fks. to 4 mi.Ck.	San Juan R 4 mi.Ck.to Navajo R	SQC 1968	Wuerthele (1975) East Fork	Wuerthele (1975) West Fork	Wuerthele (1975) Main Stem S.J.	For.Serv. 1980 data East Fork	For.Serv. 1980 data San Juan @ Pagosa	For.Serv. 1981 data East Fork	For.Serv. 1981 data West Fork	For.Serv. 1981 data San Juan @ Pagosa
phy & biol.											
Dis. Oxygen	Above 6.0	Above 6.0	Above 6.0	9.5	8.5	9.1	7-10	8-11	8.4		8.8
pH	6.5-9	6.5-9	6-9	7.8	7.7	8.1	7-9	7-9	7.1		7.0
T°C	20°C	20°C	20°C	9	12.5	14	1-18	1-21.5*	10.3	5.7	9.3
fecal coliform	200/100 ml	2000/100 ml					30	21	1		61.4
inorganic											
NH_3	.02	.02		0	0	0					
NO_2	.05	.05		0	0	0					
NO_3	10	100		0	0	0			.01		.12
TDS			Below 500 mg/l								
Total P			Below .1	0	.21*	.35*					
Chloride	250			9	7	6					
Sulfate	250			13	9	13			5.4		8.5
metals											
Arsenic	.05	.05		-	-	-					
Cadnium	.0004	.0004		-	-	-					
Copper	.005	.02		0	0	0					
Iron	.3	1.0		.1	.15	.2					
Lead	.004			C	0	0					
Zinc	-	-	0	0	0						

*Water Quality Standards Violations

the early 1970's. It is possible that the phosphorous could result from irrigation return flows flushing fertilized fields. At any rate, the presence of phosphorous is probably not consistent, could result from a lab analysis error, and does not result in nuisance growth. All other inorganic and metal parameters are well in compliance with water quality standards.

No known violations of the "WQC" Aesthetics - General Requirements" occur. The San Juan River and East and West Fork tributaries are generally free of objectionable material (debris, oil, scum, toxic materials).

Wuerthele (1975) concludes that "the San Juan River exhibited better water quality and biological communities within the monitoring area than did any other river in this study" and "seemed to be the least affected within the (San Juan) Basin by man's activities."

In summary, the San Juan River exhibits excellent water quality through at least Pagosa Springs, and meets applicable water quality eligibility criteria for Wild and Scenic River designation.

FREE FLOWING CHARACTERISTICS

The Wild and Scenic Rivers Act provides that a river must be in a free flowing natural condition to be eligible for inclusion in the Wild and Scenic Rivers system. The USDA/USDI (1970) Guidelines define free flowing as "without impoundment, diversion, straightening, riprapping or other modification of the waterway." The Guidelines further state that "low dams, diversion works, and other minor structures will not automatically preclude the river unit from being included in the National Wild and Scenic Rivers System, providing such structures do not unreasonably diminish the free flowing nature of the stream and the scenic, scientific, geological, historical, cultural, recreational, and fish and wildlife values present in the area."

No impoundments occur on the San Juan River above Navajo Reservoir. Several small diversions occur on the West Fork below West Fork Campground, but do not significantly impair the free flowing characteristics. Considerable diversions and particularly channel alternations (riprap gravel pits, diking) have significantly altered the free flowing characteristics of the East Fork in Section 31-34, T.37N., R2E., and the main stem of the San Juan below the confluence of the East and West Forks. The San Juan cannot reasonably be considered a free-flowing stream in these altered segments.

STREAMFLOWS

The USDA/USDI (1970) Guidelines provide that for a river to be eligible for Wild and Scenic River designation, "there should be sufficient volume of water-related outdoor recreation activities generally associated with comparable rivers."

Average annual water yield of the San Juan River at the Colorado-New Mexico State-line (approximately 30 miles southwest of Pagosa Springs) is 482,000 acre-feet averaging 666 cfs. The seven-day ten-year low flows (Hook, 1975) are calculated at 7.8 cfs for East Fork, 9.4 cfs for West Fork, and 20.5 cfs for the San Juan mainstem. Peak flows are usually a result of snowmelt runoff although the highest USGS gauge recorded flows result from fall frontal storms (2,460 cfs on East Fork, September 14, 1970; 16,000 cfs on San Juan at Pagosa, October 5, 1911).

The river provides sufficient water flows in a normal year to allow full enjoyment of water-related outdoor recreation (scenic viewing, fishing, floating).

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APPENDIX K

SELECTED OUTPUTS AND ACTIVITIES OF ALTERNATIVES

Selected Outputs and Activities of Alternatives

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
RECREATION										
-Developed Recreation Use (including Visitor Information Service and downhill skiing)	Thousand Visitor Days 1/	W01-06, W10	721 2/	A	835	975	1280	1545	1775	1870
				B	850	1170	1620	2080	2540	2810
				C	845	1145	1590	2040	2490	2760
				D	785	1070	1480	1900	2330	2570
				E	845	1145	1590	1960	2370	2600
				F	845	990	1300	1565	1795	1895
				G	785	1070	1480	1900	2330	2570
				H	850	1170	1620	2000	2420	2650
-Downhill Skiing Use	Thousand Visitor Days		138	A	165	195	260	315	365	385
				B	165	350	550	790	1060	1250
				C	165	350	550	790	1060	1250
				D	165	350	550	790	1060	1250
				E	165	350	550	710	940	1090
				F	165	195	260	315	365	385
				G	165	350	550	790	1060	1250
				H	165	350	550	710	940	1090
-Dispersed Recreation Use (including Wildlife and Fish)	Thousand Visitor Days	W07-W09	878	A	1250	1520	1680	1840	2000	2150
				B	1250	1520	1855	2185	2415	2540
				C	1250	1520	1800	1960	2130	2300
				D	1250	1520	1855	2185	2415	2540
				E	1250	1520	1855	2185	2415	2540
				F	1250	1520	1855	2185	2415	2540
				G	1250	1520	1855	2185	2415	2450
				H	1250	1520	1855	2185	2415	2540
-Off Road Motorized Use	Thousand Visitor Days		63	A	80	120	160	200	240	280
				B	80	100	120	140	160	175
				C	80	120	160	200	230	250
				D	80	120	160	190	220	240
				E	80	110	140	160	180	190
				F	80	100	120	140	155	165
				G	80	120	150	180	200	220
				H	80	100	120	140	155	165

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Trail Construction/ Reconstruction	Miles	L21,L22	12	A	63	63	63	63	63	63
				B	38	38	38	38	38	38
				C	50	50	50	50	50	50
				D	10	10	10	10	10	10
				E	39	52	53	53	54	54
				F	40	40	40	40	40	40
				G	45	20	45	45	45	45
				H	39	51	45	45	45	45
WILDERNESS										
-Wilderness Management (San Juan N.F.)	Thousand Acres	B02,B03	360.6	A	450.8	450.8	450.8	450.8	450.8	450.8
				B	360.6	360.6	360.6	360.6	360.6	360.6
				C	376.0	376.0	376.0	376.0	376.0	376.0
				D	360.6	360.6	360.6	360.6	360.6	360.6
				E	418.0	418.0	418.0	418.0	418.0	418.0
				F	360.6	360.6	360.6	360.6	360.6	360.6
				G	450.8	450.8	450.8	450.8	450.8	450.8
				H	418.0	418.0	418.0	418.0	418.0	418.0
-Wilderness Use (San Juan N.F.)	Thousand Visitor Days	W16-W18	134.0	A	175	200	221	244	267	292
				B	155	172	209	231	258	284
				C	164	184	224	249	279	308
				D	155	172	209	231	258	284
				E	170	193	236	264	297	328
				F	155	172	209	231	258	284
				G	175	200	245	275	310	343
				H	170	193	236	264	297	328
WILDLIFE AND FISH										
-Wildlife Habitat Improvement	Thousand Acre Equivalents Treated	CO2, CO3	130.0	A	155	155	104	109	90	114
				B	240	240	131	162	97	168
				C	131	131	95	121	76	101
				D	138	138	92	100	104	108
				E	218	218	143	193	171	180
				F	173	173	129	169	128	160
				G	152	152	91	116	96	124
				H	194	194	186	176	161	178

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Winter Range Carrying Capacity (Deer, Elk)	Thousand Animals		16.4/ 12.8	A Deer-16.4	18.3	18.3	19.5	21.4	22.6	24.5
				Elk -12.8	13.4	13.4	13.8	14.4	14.8	15.4
				B Deer-16.4	24.9	24.9	26.5	30.8	32.3	36.6
				Elk -12.8	15.5	15.5	16.0	17.3	17.8	19.1
				C Deer-16.4	18.9	18.9	19.8	21.3	22.2	22.7
				Elk -12.8	13.6	13.6	13.9	14.4	14.7	15.1
				D Deer-16.4	18.6	18.6	19.2	20.3	20.9	22.0
				Elk -12.8	13.5	13.5	13.7	14.0	14.2	14.5
				E Deer-16.4	19.9	19.9	20.9	22.8	23.8	25.7
				Elk -12.8	13.9	13.9	14.2	14.8	15.1	15.7
				F Deer-16.4	18.0	18.0	18.3	18.9	19.2	19.8
				Elk -12.8	13.3	13.3	13.4	13.6	13.7	13.9
				G Deer-16.4	19.3	19.3	20.1	21.4	22.1	23.4
				Elk -12.8	13.7	13.7	13.9	14.3	14.5	14.9
				H Deer-16.4	19.4	19.4	21.7	23.8	25.1	27.2
				Elk -12.8	13.7	13.7	14.1	14.8	15.2	15.9
-Wildlife Structures	Number	C02,C03	29	A	95	95	95	97	51	37
				B	50	50	59	62	63	67
				C	70	70	71	73	74	76
				D	19	19	19	21	23	26
				E	118	118	120	118	55	56
				F	78	78	79	82	86	73
				G	43	43	44	45	47	50
				H	76	76	78	80	83	71
RANGE										
-Grazing Use (Livestock)	Thousand Animal Unit Months 3/	W43	170.2	A	137.1	137.1	149.1	154.1	153.1	156.1
				B	171.6	171.6	188.6	198.6	208.6	218.6
				C	163.8	163.8	182.8	185.8	189.8	191.8
				D	152.6	152.6	173.6	173.6	175.6	176.8
				E	166.6	166.6	185.6	183.6	190.6	195.6
				F	168.6	168.6	187.1	187.1	192.1	195.1
				G	174.1	174.1	193.1	193.1	198.1	198.1
				H	169.5	169.5	190.8	194.1	197.6	200.2

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
TIMBER										
-Programmed Sales Offered	Million Board Feet	Y37,Y40 Y45	33.8	A	26.0	26.0	26.0	26.0	26.0	35.2
				B	72.4	72.4	72.4	72.4	72.4	72.4
				C	34.0	34.0	34.0	34.0	34.0	37.2
				D	20.8	20.8	32.8	34.4	36.0	41.2
				E	32.4	32.4	34.0	34.8	35.2	40.0
				F	35.2	35.2	38.8	42.0	44.8	72.4
				G	40.0	40.0	40.0	40.0	40.0	45.6
				H	40.0	40.0	42.0	44.0	46.0	61.2
-Reforestation 4/	Thousand Acres	E04	3.4	A	3.8	2.9	0.3	2.9	1.4	0.0
				B	7.1	4.7	6.0	6.2	3.5	9.0
				C	8.4	7.5	1.7	1.6	1.9	2.2
				D	2.0	0.0	0.0	2.1	2.5	2.4
				E	3.8	2.3	0.2	0.5	0.2	0.0
				F	2.4	0.0	0.2	0.7	0.0	3.4
				G	2.1	0.1	1.4	1.3	0.7	2.8
				H	4.0	2.3	1.2	2.8	0.1	6.1
-Timber Stand Improvement	Thousand Acres	E05	3.3	A	6.7	6.7	6.7	5.3	6.3	6.3
				B	11.5	11.5	10.9	7.2	7.2	3.1
				C	9.4	9.4	9.4	8.9	8.9	7.7
				D	9.2	9.2	9.2	7.8	6.4	4.9
				E	10.0	10.0	10.0	10.0	10.0	10.0
				F	11.9	11.9	11.9	11.4	11.4	9.1
				G	9.2	9.2	9.2	9.1	9.1	7.3
				H	9.4	9.4	8.9	8.7	8.7	6.4
WATER										
-Meeting Water Quality Goals	Million Acre-Feet	Y77	1.85	A	1.85	1.85	1.85	1.89	1.89	1.89
				B	1.85	1.85	1.81	1.78	1.74	1.71
				C	1.85	1.85	1.85	1.89	1.89	1.89
				D	1.85	1.85	1.85	1.89	1.89	1.89
				E	1.85	1.85	1.85	1.89	1.89	1.89
				F	1.85	1.85	1.85	1.89	1.89	1.89
				G	1.85	1.85	1.85	1.89	1.89	1.89
				H	1.85	1.85	1.85	1.89	1.89	1.89

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Average Annual Yield	Million Acre-Feet		2.5	A	2.500	2.500	2.503	2.511	2.515	2.515
				B	2.520	2.520	2.563	2.566	2.574	2.578
				C	2.501	2.501	2.507	2.513	2.525	2.529
				D	2.500	2.500	2.505	2.507	2.510	2.512
				E	2.503	2.503	2.506	2.526	2.535	2.533
				F	2.500	2.500	2.508	2.520	2.520	2.519
				G	2.501	2.501	2.508	2.514	2.518	2.517
				H	2.503	2.500	2.511	2.520	2.520	2.519
MINERALS	Number of Operating Plans	G01-G08	153	All	296	392	454	520	606	612
HUMAN AND COMMUNITY DEVELOPMENT										
-Human Resource Program	Enrollee Years	X11-X17	31	All	25	N/A	N/A	N/A	N/A	N/A
-Direct, Indirect & Induced Employment	Person Years		22,606	A	23,750	23,750	N/A	N/A	N/A	N/A
				B	25,784	25,784	N/A	N/A	N/A	N/A
				C	25,094	25,094	N/A	N/A	N/A	N/A
				D	24,840	24,840	N/A	N/A	N/A	N/A
				E	25,317	25,317	N/A	N/A	N/A	N/A
				F	23,858	23,858	N/A	N/A	N/A	N/A
				G	25,492	25,492	N/A	N/A	N/A	N/A
				H	25,520	25,520	N/A	N/A	N/A	N/A

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
PROTECTION										
-Fire Management Effectiveness Index	Dollars/ Thousand Acres	Z91	103	A	103	108	113	118	118	118
				B	103	108	108	108	108	108
				C	103	108	113	118	118	118
				D	103	108	108	113	108	113
				E	103	108	108	113	113	118
				F	103	108	108	113	113	118
				G	103	108	108	108	108	113
				H	103	108	113	113	118	118
-Fuelbreaks and Fuel Treatment	Thousand Acres	P11-P14	4.2	A	3.9	3.9	3.9	3.9	3.9	3.9
				B	7.9	7.9	7.9	7.9	7.9	7.9
				C	5.4	5.4	5.4	5.4	5.4	5.4
				D	7.2	7.2	7.2	7.2	7.2	7.2
				E	6.5	6.5	6.5	6.5	6.5	6.5
				F	6.0	6.0	6.0	6.0	6.0	6.0
				G	7.8	7.8	7.8	7.8	7.8	7.8
				H	7.2	7.2	7.2	7.2	7.2	7.2
-Insect and Disease Surveys	Thousand Acres		1868	All	1868	1868	1868	1868	1868	1868
LANDS										
-Land Purchase and Acquisition (Excludes Exchange)	Acres	J15	0	A	80	80	80	80	80	80
				B	160	160	160	160	160	160
				C	100	100	100	100	100	100
				D	80	80	80	80	80	80
				E	2504	1130	--	--	--	--
				F	80	80	80	80	80	80
				G	80	80	80	80	80	80
				H	100	100	100	100	100	100

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Land Exchange	Acres	J14	0	A	250	250	250	250	250	250
				B	1000	1000	1000	1000	500	500
				C	500	500	500	500	250	250
				D	250	250	250	250	250	250
				E	750	750	750	750	750	750
				F	250	250	250	250	250	250
				G	250	250	250	250	250	250
				H	500	500	500	500	250	250
-Rights-of-Way Acquisition	Cases	J18	4	A	2	2	2	2	2	2
				B	4	4	4	4	2	2
				C	3	3	3	3	3	2
				D	2	2	2	2	2	2
				E	4	4	4	4	2	2
				F	3	3	3	3	3	2
				G	2	2	2	2	2	2
				H	3	3	3	3	3	2
-Occupancy Trespass	Cases		2	A	3	3	3	3	3	3
				B	6	6	6	6	6	6
				C	4	4	4	4	4	4
				D	2	2	2	2	2	2
				E	8	8	8	8	8	8
				F	3	3	3	3	3	3
				G	2	2	2	2	2	2
				H	4	4	4	4	4	4
-Land Line Location	Miles		29	A	30	26	26	26	26	26
				B	60	64	64	64	64	64
				C	33	30	30	30	30	30
				D	15	15	15	15	15	15
				E	85	85	85	85	85	0
				F	32	29	29	29	29	29
				G	30	26	26	26	26	26
				H	45	45	45	45	45	45

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
SOILS										
-Soil and Water Resource Improvement (improved Watershed Condition)	Acres	Y86	60	A	168	168	70	64	82	59
				B	225	225	62	19	9	24
				C	226	226	49	47	24	24
				D	68	68	19	6	7	7
				E	186	186	39	48	298	102
				F	87	87	15	19	8	10
				G	78	78	16	9	16	18
				H	158	158	66	36	19	21
-Annual Soil Surveys	Thousand Acres	Y90,K01	90.5	A	63	63	72	10	10	10
				B	104	104	10	10	10	10
				C	70	70	68	10	10	10
				D	67	67	62	8	8	8
				E	150	150	10	10	10	10
				F	100	100	46	10	5	10
				G	87	86	56	10	10	10
				H	85	85	57	10	10	10
FACILITIES										
-Road Construction/ Reconstruction (Arterial)	Miles	L04,L05	0.0	A	3.9	3.9	5.1	2.3	2.9	1.2
				B	6.5	6.5	5.5	5.0	2.5	3.3
				C	4.5	4.5	3.9	4.7	1.0	1.4
				D	4.8	4.8	5.1	3.2	3.0	2.1
				E	4.0	4.0	3.7	3.5	3.4	2.0
				F	5.6	5.6	5.0	9.8	2.1	2.3
				G	7.2	7.2	5.5	3.4	2.1	2.7
				H	4.8	4.8	6.6	3.5	1.4	1.5
-Road Construction/ Reconstruction (Collector)	Miles	L08,L09	5.0	A	8.3	8.3	10.5	4.8	6.2	2.6
				B	13.2	13.2	11.4	10.5	5.3	6.9
				C	9.5	9.5	8.0	9.5	2.5	3.2
				D	10.5	10.5	11.4	7.3	6.7	4.2
				E	8.3	8.3	7.6	7.4	7.3	4.2
				F	11.3	11.3	10.1	19.8	4.3	5.0
				G	14.8	14.8	11.4	7.0	5.5	5.8
				H	9.8	9.8	13.5	7.4	3.1	3.1

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
BENEFITS 5/										
-Returns to Treasury	Thousand Dollars		746.7	A	1779.20	1779.20	1739.20	2031.40	1697.48	2354.88
				B	4943.12	4943.12	4018.80	5288.76	5248.56	5300.80
				C	2068.68	2068.68	2224.40	2293.36	2262.20	2413.48
				D	2019.48	2019.48	2148.40	2047.44	2101.12	2507.20
				E	1853.20	1853.20	2162.40	1790.48	2093.20	2344.04
				F	2244.72	2244.72	2207.20	2438.96	2743.56	3385.84
				G	2422.32	2422.32	2502.40	2382.28	2569.96	2795.20
				H	2355.48	2355.48	2605.60	2748.92	3152.76	3280.44
-Payment to Counties	Thousand Dollars		186.7	A	444.8	444.8	434.8	507.9	424.4	588.7
				B	1235.8	1235.8	1004.7	1322.2	1312.1	1325.2
				C	517.2	517.2	556.1	573.3	565.5	603.4
				D	504.9	504.9	537.1	511.9	523.3	626.8
				E	463.3	463.3	540.6	447.6	523.3	586.0
				F	561.2	561.2	551.8	609.7	685.9	846.5
				G	605.6	605.6	625.6	595.6	642.5	698.8
				H	588.9	588.9	651.4	687.2	788.2	820.1
-Direct, Indirect and Induced Income	Million Dollars		273.7	A	290.1	290.1	N/A	N/A	N/A	N/A
				B	320.4	320.4	N/A	N/A	N/A	N/A
				C	308.7	308.7	N/A	N/A	N/A	N/A
				D	311.7	311.7	N/A	N/A	N/A	N/A
				E	308.7	308.7	N/A	N/A	N/A	N/A
				F	291.9	291.9	N/A	N/A	N/A	N/A
				G	315.1	315.1	N/A	N/A	N/A	N/A
				H	315.4	315.4	N/A	N/A	N/A	N/A
COSTS 5/										
-All Elements	Thousand Dollars		4,851	A	4591	4911	5094	4279	4461	3901
				B	7050	8069	7249	7066	6797	6552
				C	4797	5251	4796	5080	4447	4374
				D	3289	4013	3968	3760	3739	3605
				E	5615	6267	4943	4798	4981	4515
				F	4651	5495	5045	5700	4181	5392
				G	4364	5112	4373	4194	3604	4161
				H	4661	5333	5693	5202	4396	4473

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Capital Investments	Thousand Dollars		1,584	A	2329	1951	2077	1670	1758	1516
				B	2773	1789	1609	1534	1142	1265
				C	2075	1698	1561	1674	1154	1204
				D	1845	1069	1103	845	790	684
				E	2102	1515	1412	1384	1363	1128
				F	2534	1637	1529	2218	1112	1165
				G	2750	1549	1703	1399	1214	1302
				H	2129	1632	1812	1526	1145	1127
-Backlog 6/	Thousand Dollars		945	A	613	175	175	124	124	124
				B	1441	430	430	305	305	305
				C	638	201	201	143	143	143
				D	913	101	101	71	71	71
				E	1263	571	571	405	405	405
				F	1144	195	195	138	138	138
				G	1011	175	175	124	124	124
				H	1034	302	302	214	214	214
-Total Appropriated	Thousand Dollars		6,435	A	6920	6862	7171	5949	6219	5417
				B	9823	9858	8858	8600	7939	7817
				C	6872	6949	6357	6754	5601	5578
				D	5134	5082	5071	4605	4529	4289
				E	7717	7782	6355	6182	6344	5643
				F	7185	7132	6574	7918	5293	6557
				G	7114	6661	6076	5593	4818	5463
				H	6970	6965	7505	6728	5541	5600
-Allocated Funds	Thousand Dollars		54	A	141	75	75	75	75	75
				B	234	168	168	168	168	168
				C	170	94	94	94	94	94
				D	160	94	94	94	94	94
				E	2404	1057	0	0	0	0
				F	143	75	75	75	75	75
				G	141	75	75	75	75	75
				H	160	94	94	94	94	94

Selected Outputs and Activities of Alternatives (Continued)

Resource	Unit of Measure	MIH Code	Current Year (1980)	Alternative	Annual Units 1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
-Total National Forest System	Thousand Dollars		6,489	A	7061	6937	7246	6024	6294	5492
				B	10057	10026	9026	8768	8107	7985
				C	7042	7043	6451	6848	5695	5672
				D	5294	5176	5165	4699	4623	4383
				E	10121	8839	6355	6182	6344	5643
				F	7328	7207	6649	7993	5368	6632
				G	7255	6736	6151	5668	4893	5538
				H	6950	7059	7599	6822	5635	5694

1/ Recreation Visitor Day = 12 hours of recreation for one person or one hour of recreation for 12 persons or any combination thereof.

2/ For comparison purposes, a hypothetical 109 thousand visitor days have been added to the 1980 developed recreation outputs to represent use at the McPhee recreation sites. These sites are planned and will be available for public use by 1985.

3/ Animal Unit Month = the amount of forage consumed by one mature cow or its equivalent in a one-month period.

4/ Reforestation figures include site preparation for natural regeneration.

5/ All benefits and costs are in constant 1978 dollars.

6/ Backlog expenditures include land line location and reforestation which are also included in operation and maintenance and capital investment figures respectively; backlog figures are therefore not additive.

APPENDIX L

DETERMINATION OF LANDS AVAILABLE, CAPABLE AND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION

DETERMINATION OF LANDS AVAILABLE, CAPABLE AND TENTATIVELY SUITABLE FOR TIMBER PRODUCTION

One requirement in the planning process is to determine lands capable, available and suitable for timber production. The following process was followed:

-Total net acres of the San Juan National Forest were divided into water acres and land acres.

-Land area was classified into either forest land (that which is at least 16 percent stocked by trees or formerly had trees) or non-forest land.

-Forest land was determined to be either capable or not capable. Capable forest land has the biological growing potential to produce at least 20 cubic feet of wood per acre per year. Anything less is classified as Not Capable forest land.

-Lands determined capable were judged as to their availability for timber production; not available lands are those productive forest lands legislatively or administratively withdrawn from timber production. This classification includes Wilderness Areas, Wilderness Study Areas, Research Natural Areas, Wild and Scenic River Corridors, and Administrative Sites.

-Land both capable and available for timber production was then evaluated as to suitability. Two physical suitability tests are required:

1. The first test is whether technology is available to ensure that timber production, including harvesting, does not result in irreversible resource damage to soil productivity or watershed condition. Availability of technology is judged on whether technology is currently developed and available for use. This is not an economic test, and the technology does not necessarily have to be available in the local area. The conclusion is that technology is available to harvest timber from all areas of the Forest while adequately protecting the soil and water resource.

2. The second test is whether there is reasonable assurance that such lands can be adequately restocked within five years after final harvest. Ponderosa pine on slopes greater than 30 percent cannot be reasonably assured of adequate restocking within five years after final harvest. Currently non-stocked ponderosa pine stands on any slope cannot be reforested with reasonable assurance of plantation establishment.

   Non-stocked land has less than 40 BA of pole timber or sawtimber size trees or less than 300 trees per acre of seedling

or sapling size trees. Currently non-stocked land is non-stocked at the time of Forest Plan preparation. Land which may become non-stocked in the future is not included in this category.

All of the currently non-stocked ponderosa pine land is now fully occupied with other vegetation. Most of the currently non-stocked ponderosa pine land became non-stocked as a result of timber harvesting from 1900 to 1940. These lands have been occupied with other vegetation for the past 40-80 years. This other vegetation, mostly Gambel oak, competes with ponderosa pine and precludes establishment of pine seedlings. The environment necessary for ponderosa pine establishment does not presently exist. Continuous efforts have been made to reforest these sites and, with few exceptions, these efforts have failed. Based on current site factors and historic records of regeneration failure, it has been determined that a reasonable chance of plantation success does not exist on these lands. Therefore they are determined to be technologically not suitable.

With changes in technology these lands may be reclassified as tentatively suitable. During the next 10-year period, a portion of these lands will be planted with ponderosa pine using the most recent state-of-the-art reforestation techniques. The success or failure of these plantations will determine future classification of these lands.

Currently stocked stands of ponderosa pine on slopes less than 30 percent are tentatively suitable for timber production. There is reasonable assurance that these stands can be regenerated within five years of final harvest. On sites currently occupied with ponderosa pine, the trees maintain an environment favorable for tree growth. Wind movement through the stand is modified by the trees, hence soil drying by wind is reduced. Trees provide shade, and soil drying by solar radiation is reduced. Shade also reduces the vigor of competing understory vegetation. Competing understory vegetation can be further reduced in vigor by periodic prescribed burning using low intensity fires.

In addition to periodic burning, it is necessary to remove understory vegetation at the time of a regeneration cut. This must be done immediately after the regeneration cut and before plants can respond to increased solar radiation.

A loose mineral soil seedbed is a requirement for natural establishment of ponderosa pine seedlings. It is also very desirable if the area is to be planted. Plowing or discing, using mechanized equipment, has been successful in removing understory vegetation while at the same time preparing a loose mineral soil seedbed.

The above practices can be accomplished on slopes less than 30 percent with resultant reasonable assurance that stands can be regenerated. However, the fact that mechanized equipment is necessary both for removing understory vegetation and preparing a mineral seedbed restricts this assurance to areas where equipment can be used. Because of equipment limitations and the potential for accelerated erosion, equipment is restricted to slopes less than 30 percent. Use on slopes greater than 30 percent could result in a 15-fold increase in the erosion rate, causing irreparable loss to the long-term productivity of the site. Therefore, ponderosa pine on slopes greater than 30 percent is technologically not suitable.

Available productive forest land failing to meet either of these tests was classed as physically not suitable forest land. Available forest land passing both tests was classed as tentatively suitable, productive timber land.

The results of the above assessment are shown in Chapter III. The following tables display and compare the various categories of land classification.

-Table I compares present timber classification with the 1976 Timber Management Plan.

-Table II compares land presently classified as tentatively suitable with the 1976 Timber Management Plan by type and stand size class.

-Table III is a summary of Forest classification of capable forest land by type and stand size class.

-Table IV is a summary of Forest classification of capable forest land by type and slope class.

Of the lands identified as tentatively suitable, economic considerations were used to help identify lands actually suitable for timber production in the various alternatives. These are defined as lands that are cost-efficient in meeting timber production goals for the respective alternatives. Such lands were tentatively identified by using FORPLAN to help select analysis areas on which timber harvesting prescriptions would be applied. This acreage information was then used by District Rangers and their staff in determining where to apply specific prescriptions on the ground. By incorporating their knowledge of actual site-specific conditions, District personnel were able to control the location of timber harvesting activities to maximize cost-efficiency of timber production. The results of this step are shown in Chapter IV.

The changes in acreages of the various land classifications between the 1976 Timber Management Plan and this Forest Plan (Tables I and II) can be explained to some extent by the use of different inventory techniques. Basic differences were:

1. The plan inventory in 1976 was based on 1967 Forest Survey data using an inventory system of a double sample technique in combination with photogrammetric interpretation of non-sampled stands.

2. The Forest Plan inventory used a combination of LANDSAT satellite imagery, three-acre cells interpreted for accuracy by district foresters using aerial photos, infrared photos, previous survey data and timber type maps. A plan to test the accuracy of the LANDSAT system is being developed.

Another difference between the two inventories resulted from reclassifying some acres from commercial to non-commercial forest land as a result of the Reforestation Backlog Environmental Assessment approved in December 1980. This included 98,000 acres in the Gambel oak type which had been misclassified as non-stocked ponderosa pine.

Also, there are an additional 85,911 acres of ponderosa pine that were determined in the Forest Plan inventory to be not technologically suited for timber production as discussed above.

TABLE I

Comparison of Classification Categories with 1976 Timber Management Plan

	1976 Timber Management Plan (Acres)	This Plan (Acres)	Percent Change
Area Summary			
Net National Forest	1,850,300	1,867,782	+1%
Total Forested Land	1,559,700	1,346,562	-14%
Total Capable Forest Land 1/	1,388,500	1,119,006	-19%
Total Capable and Available Forest Land 2/	1,098,300	801,474	-27%
Total Not Capable Forest Land 3/	171,200	227,556	+33%
Total Non-Forest Land and Water	290,600	521,220	+79%
Capable Forest Land Not Available			
Capable Reserved	139,000	158,203	+14%
Capable Deferred 4/	151,200	73,418	-51%
Capable Admin. Withdrawal	-0-	-0-	-0-

1/ Capable forest land in the Forest Plan; productive forest land in the 1976 Timber Management Plan.

2/ Tentatively suitable forest land in the Forest Plan; commercial forest land in the 1976 Timber Management Plan.

3/ Not capable forest land in the Forest Plan; non-productive forest land in the 1976 Timber Management Plan.

4/ Includes the Wilderness Study Areas.

TABLE II

Comparison of Classification Categories with 1976 Timber Management Plan by Type and Stand Size Class

Type and Stand Size Class	1976 Timber Management Plan Commercial Forest Acres	Tentatively Suitable Acres for Forest Plan Alternatives	Percent Change
Ponderosa pine			
Non-stocked	147,000	-0-	-100%
Seed-sap	-0-	1,855	
Poletimber	-0-	8,785	
Sawtimber	185,000	116,970	-37%
Total	332,000	127,610	-62%
Spruce-fir			
Non-stocked	17,000	17,770	-5%
Seed-sap	10,000	16,921	+69%
Poletimber	10,000	6,118	-39%
Sawtimber	284,000	269,171	-5%
Total	321,000	310,733	-6%
Douglas-fir			
Non-stocked	21,000	4,138	-80%
Seed-sap	3,000	427	-86%
Poletimber	10,000	4,798	-52%
Sawtimber	186,000	115,429	-38%
Total	220,000	124,792	-43%
Aspen			
Non-stocked	60,000	16,392	-73%
Seed-sap	24,000	4,846	-80%
Poletimber	89,000	97,058	+9%
Sawtimber	52,000	120,043	+131%
Total	225,000	238,339	+6%
Total All	1,098,000	801,474	-27%

TABLE III

Forest Classification Area of Capable Forest Land by Type and Stand Size Class (Acres)

	Stand Size Class				
	Non-stocked	Seedling/ Sapling	Pole-timber	Saw-timber	Total
CAPABLE FOREST LAND					
NOT AVAILABLE					
Reserved					
Ponderosa pine	227	--	--	1,542	1,769
Spruce-fir	6,103	158	7,150	115,455	128,866
Douglas-fir	273	--	220	13,263	13,756
Aspen	1,644	--	7,732	4,436	13,812
Total	8,247	158	15,102	134,696	158,203
Deferred					
Ponderosa pine	750	--	1,157	2,111	4,018
Spruce-fir	215	--	2,509	21,911	24,635
Douglas-fir	--	--	258	24,969	25,227
Aspen	36	--	10,090	9,412	19,538
Total	1,001		14,014	58,403	73,418
AVAILABLE					
Not Technologically Suitable					
Ponderosa pine	56,443	--	2,259	27,209	85,911
Tentatively Suitable					
Ponderosa pine	0	1,855	8,785	116,970	127,610
Spruce-fir	17,770	17,486	6,306	269,171	310,733
Douglas-fir	4,138	427	4,798	115,429	124,792
Aspen	16,392	4,846	97,058	120,043	238,339
Total	38,300	24,614	116,947	621,613	801,474
Total All	103,991	24,772	148,322	841,921	1,119,006
Percent		10	2	13	75

TABLE IV

Forest Classification Area of Capable Forest Land by Type and Slope Class (Acres)

	Slope Class			
	0-30%	30-60%	60% +	Total
CAPABLE FOREST LAND				
NOT AVAILABLE				
Reserved				
Ponderosa pine	454	454	861	1,769
Spruce-fir	21,966	50,806	56,094	128,866
Douglas-fir	2,373	3,198	8,185	13,756
Aspen	3,783	6,945	3,084	13,812
Total	28,576	61,403	68,224	158,203
Deferred				
Ponderosa pine	2,172	1,688	158	4,018
Spruce-fir	6,428	11,626	6,581	24,635
Douglas-fir	9,601	11,587	4,039	25,227
Aspen	9,278	7,222	3,038	19,538
Total	27,479	32,123	13,816	73,418
AVAILABLE				
Not Technologically Suitable				
Ponderosa pine	49,261	29,236	7,414	85,911
Tentatively Suitable				
Ponderosa pine	127,610	--	--	127,610
Spruce-fir	107,617	129,364	73,752	310,733
Douglas-fir	55,450	52,809	16,533	124,792
Aspen	109,136	73,220	55,983	238,339
Total	399,813	255,393	146,268	801,474
Total All	505,129	378,155	235,722	1,119,006
Percent	45	34	21	100

APPENDIX M

OUTPUTS OF MANAGEMENT ALTERNATIVES FOR LIZARD HEAD, WEMINUCHE AND SOUTH SAN JUAN WILDERNESSES

OUTPUTS OF MANAGEMENT ALTERNATIVES FOR LIZARD HEAD, WEMINUCHE AND SOUTH SAN JUAN WILDERNESSES

Because of the need for uniform management direction on designated wildernesses which are on more than one Forest, this draft EIS develops alternatives and discloses the effects of alternatives for management direction of an entire wilderness. This is done for the following wildernesses:

Name	Net N.F. Acres	Administrative Unit
Lizard Head Wilderness	21,400	San Juan N. F.
Lizard Head Wilderness	18,600	Uncompahgre N. F.
	40,000	
Weminuche Wilderness	294,284	San Juan N. F.
Weminuche Wilderness	168,940	Rio Grande N. F.
	463,224	
South San Juan Wilderness	45,000	San Juan N. F.
South San Juan Wilderness	88,463	Rio Grande N. F.
	133,463	

The overall effects of alternatives relating to these wildernesses are discussed in the body (Chapter IV) of this draft EIS. The one exception is the economic efficiency analysis which will be covered in the specific environmental impact statements for the individual Forests. This is necessary in order to incorporate the total costs and benefits (including wilderness management) within each Forest's overall analysis of alternatives.

The purpose of this appendix is to show more detailed information by individual Forest for each wilderness than is portrayed in Chapter IV. This is done in five tables.

-Table I shows estimated wilderness management area acreage.

-Table II shows the estimated visitor days.

-Table III shows the estimated authorized livestock grazing.

-Table IV shows mineral leasing recommendations.

-Table V shows estimated base water yield.

TABLE I

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
ALTERNATIVE A					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,840	1,440	3,200	1,920	21,400
Uncompahgre NF	4,860	8,530	3,690	1,520	18,600
Weminuche					
San Juan NF	225,484	26,560	36,320	5,920	294,284
Rio Grande NF	32,657	17,893	118,390	0	168,940
South San Juan					
San Juan NF	37,640	5,600	1,760	0	45,000
Rio Grande NF	20,818	3,948	62,717	980	88,463
Wilderness Study Areas					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	0	640	41,500
South San Juan Expansion	22,720	8,000	2,080	0	32,800
San Juan NF Total	345,664	52,320	44,320	8,480	450,784
Rio Grande NF Total	53,475	21,841	181,107	980	257,403
Uncompahgre NF Total	4,860	8,530	3,690	1,520	18,600
TOTAL	403,999	82,691	229,117	10,980	726,787
ALTERNATIVES B, D, AND F					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,840	1,440	3,200	1,920	21,400
Uncompahgre NF	10,340	4,600	3,260	400	18,600

TABLE I (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
Weminuche					
San Juan NF	225,484	26,560	36,320	5,920	294,284
Rio Grande NF	32,657	17,893	118,390	0	168,940
South San Juan					
San Juan NF	37,640	5,600	1,760	0	45,000
Rio Grande NF	20,818	3,948	62,717	980	88,463
Wilderness Study Areas	0	0	0	0	0
San Juan NF Total	277,964	33,600	41,280	7,840	360,684
Rio Grande NF Total	53,475	21,841	181,107	980	257,403
Uncompahgre NF Total	10,340	4,600	3,260	400	18,600
TOTAL	341,779	60,041	225,647	9,220	636,687

ALTERNATIVE C

Existing Wildernesses

Lizard Head					
San Juan NF	14,840	1,440	3,200	1,920	21,400
Uncompahgre NF	10,340	4,600	3,260	400	18,600
Weminuche					
San Juan NF	225,484	26,560	36,320	5,920	294,284
Rio Grande NF	32,657	17,893	118,390	0	168,940
South San Juan					
San Juan NF	37,640	5,600	1,760	0	45,000
Rio Grande NF	20,818	3,948	62,717	980	88,463
Wilderness Study Areas					
West Needle	14,040	800	960	0	15,800

TABLE I (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
San Juan NF Total	292,004	34,400	42,240	7,840	376,484
Rio Grande NF Total	53,475	21,841	181,107	980	257,403
Uncompahgre NF Total	10,340	4,600	3,260	400	18,600
TOTAL	355,819	60,841	226,607	9,220	652,487
ALTERNATIVES E AND H					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,840	1,440	3,200	1,920	21,400
Uncompahgre NF	10,340	4,600	3,260	400	18,600
Weminuche					
San Juan NF	225,484	26,560	36,320	5,920	294,284
Rio Grande NF	32,657	17,893	118,390	0	168,940
South San Juan					
San Juan NF	37,640	5,600	1,760	0	45,000
Rio Grande NF	20,818	3,948	62,717	980	88,463
Wilderness Study Areas					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	0	640	41,500
San Juan NF Total	322,944	44,320	42,240	8,480	417,984
Rio Grande NF Total	53,475	21,841	181,107	980	257,403
Uncompahgre NF Total	10,340	4,600	3,260	400	18,600
TOTAL	386,759	70,761	226,607	9,860	693,987

TABLE I (Continued)

Estimated Wilderness Management Area Acreage by Alternative, Area, and Forest

Area	Pristine	Primitive	Semi-Primitive	Transition	Total
ALTERNATIVE G					
Existing Wildernesses					
Lizard Head					
San Juan NF	14,840	1,440	3,200	1,920	21,400
Uncompahgre NF	10,340	4,600	3,260	400	18,600
Weminuche					
San Juan NF	225,484	26,560	36,320	5,920	294,284
Rio Grande NF	32,657	17,893	118,390	0	168,940
South San Juan					
San Juan NF	37,640	5,600	1,760	0	45,000
Rio Grande NF	20,818	3,948	62,717	980	88,463
Wilderness Study Areas					
West Needle	14,040	800	960	0	15,800
Piedra	30,940	9,920	0	640	41,500
South San Juan Expansion	22,720	8,000	2,080	0	32,800
San Juan NF Total	345,664	52,320	44,320	8,480	450,784
Rio Grande NF Total	53,475	21,841	181,107	980	257,403
Uncompahgre NF Total	10,340	4,600	3,260	400	18,600
TOTAL	409,479	78,761	228,687	9,860	726,787

TABLE II

Estimated Wilderness Visitor Days by Alternative and Time Periods (Thousand wilderness visitor days)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALTERNATIVE A							
Lizard Head							
San Juan NF	13	15	17	19	21	22	23
Uncompahgre NF	8	9	10	12	13	14	16
Weminuche							
San Juan NF	121	134	147	162	179	197	217
Rio Grande NF	72	110	121	140	148	161	178
South San Juan							
San Juan NF	5	6	8	9	10	11	12
Rio Grande NF	30	53	58	64	70	75	85
TOTAL	249	327	361	406	441	480	531
ALTERNATIVES B, C, D, E, F, G, and H							
Lizard Head							
San Juan NF	13	15	17	20	23	25	28
Uncompahgre NF	8	9	10	12	13	14	16
Weminuche							
San Juan NF	121	134	147	179	196	219	240
Rio Grande NF	72	110	121	147	162	179	198
South San Juan NF							
San Juan NF	5	6	8	10	12	14	16
Rio Grande NF	30	53	58	71	78	86	95
TOTAL	249	327	361	439	484	537	593

TABLE III

Estimated Authorized Livestock Grazing in Existing Wildernesses (Thousand animal unit months per year)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALL ALTERNATIVES							
Lizard Head							
San Juan	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Uncompahgre	.9	.9	.9	.9	.9	.9	.9
Weminuche							
San Juan	9.1	9.1	9.1	9.1	9.1	9.1	9.1
Rio Grande	6.8	6.8	6.8	6.8	6.8	6.8	6.8
South San Juan							
San Juan	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Rio Grande	7.1	7.1	7.1	7.1	7.1	7.1	7.1
TOTAL	27.3	27.3	27.3	27.3	27.3	27.3	27.3

TABLE IV

Mineral Leasing Recommendations for Designated Wildernesses.

Area and Forest	Leasing Availability Recommendations	Alternatives A		B		C		D		E		F		G		H	
		Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%
South San Juan (San Juan National Forest)	No Lease	36,372	81	33,537	75	34,224	76	33,669	75	33,669	75	45,000	100	36,372	81	34,224	76
	Lease	513	1	513	1	513	1	513	1	513	1	0	0	513	1	513	1
	Lease without Surface Occupancy	8,115	18	10,950	24	10,263	23	10,818	24	10,818	24	0	0	8,115	18	10,263	23
	Total for Area	45,000	100	45,000	100	45,000	100	45,000	100	45,000	100	45,000	100	45,000	100	45,000	100
South San Juan (Rio Grande National Forest)	No Lease	65,531	74	65,161	73	65,531	74	65,161	73	65,161	73	88,463	100	65,531	74	65,531	74
	Lease	3,232	4	3,232	4	3,232	4	3,232	4	3,232	4	0	0	3,232	4	3,232	4
	Lease without Surface Occupancy	19,700	22	20,070	23	19,700	22	20,070	23	20,070	23	0	0	19,700	22	19,700	22
	Total for Area	88,463	100	88,463	100	88,463	100	88,463	100	88,463	100	88,463	100	88,463	100	88,463	100
Entire South San Juan Wilderness	No Lease	101,903	76	98,698	74	99,755	75	98,830	74	98,830	74	133,463	100	101,903	76	99,755	75
	Lease	3,745	3	3,745	3	3,745	3	3,745	3	3,745	3	0	0	3,745	3	3,745	3
	Lease without Surface Occupancy	27,815	21	31,020	23	29,963	22	30,888	23	30,888	23	0	0	27,815	21	29,963	22
	Total for Area	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100	133,463	100
Weminuche (San Juan National Forest)	No Lease	210,904	72	209,968	71	210,904	72	209,968	71	210,497	72	294,284	100	209,968	71	210,904	72
	Lease	44,540	15	44,540	15	44,540	15	44,540	15	44,540	15	0	0	44,540	15	44,540	15
	Lease without Surface Occupancy	38,840	13	39,776	14	38,840	13	39,776	14	39,247	13	0	0	39,776	14	38,840	13
	Total for Area	294,284	100	294,284	100	294,284	100	294,284	100	294,284	100	294,284	100	294,284	100	294,284	100

TABLE IV (Continued)

Mineral Leasing Recommendations for Designated Wildernesses.

Area and Forest	Leasing Availability Recommendations	Alternatives A Acres	%	B Acres	%	C Acres	%	D Acres	%	E Acres	%	F Acres	%	G Acres	%	H Acres	%
Weminuche (Rio Grande National Forest)	No Lease	106,132	63	106,132	63	106,132	63	106,132	63	106,132	63	168,940	100	106,132	63	106,132	63
	Lease	15,320	9	15,320	9	15,320	9	15,320	9	15,320	9	0	0	15,320	9	15,320	9
	Lease without Surface Occupancy	47,488	28	47,488	28	47,488	28	47,488	28	47,488	28	0	0	47,488	28	47,488	28
	Total for Area	168,940	100	168,940	100	168,940	100	168,940	100	168,940	100	168,940	100	168,940	100	168,940	100
Entire Weminuche Wilderness	No Lease	317,036	68	316,100	68	317,036	68	316,100	68	316,629	68	463,224	100	316,100	68	317,036	68
	Lease	59,860	13	59,860	13	59,860	13	59,860	13	59,860	13	0	0	59,860	13	59,860	13
	Lease without Surface Occupancy	86,328	19	87,264	19	86,328	19	87,264	19	86,735	19	0	0	87,264	19	86,328	19
	Total for Area	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100	463,224	100
Lizard Head (San Juan National Forest)	No Lease	5,963	28	5,963	28	5,963	28	5,963	28	5,963	28	21,400	100	5,963	28	5,963	28
	Lease	9,793	46	9,793	46	9,793	46	9,793	46	9,793	46	0	0	9,793	46	9,793	46
	Lease without Surface Occupancy	5,644	26	5,644	26	5,644	26	5,644	26	5,644	26	0	0	5,644	26	5,644	26
	Total for Area	21,400	100	21,400	100	21,400	100	21,400	100	21,400	100	21,400	100	21,400	100	21,400	100
Lizard Head (Uncompahgre National Forest)	No Lease	9,786	53	9,786	53	9,786	53	9,786	53	9,786	53	18,600	100	9,786	53	9,786	53
	Lease	741	4	741	4	741	4	741	4	741	4	0	0	741	4	741	4
	Lease without Surface Occupancy	8,073	43	8,073	43	8,073	43	8,073	43	8,073	43	0	0	8,073	43	8,073	43
	Total for Area	18,600	100	18,600	100	18,600	100	18,600	100	18,600	100	18,600	100	18,600	100	18,600	100

TABLE IV (Continued)

Mineral Leasing Recommendations for Designated Wildernesses.

Area and Forest	Leasing Availability Recommendations	Alternatives A Acres	%	B Acres	%	C Acres	%	D Acres	%	E Acres	%	F Acres	%	G Acres	%	H Acres	%
Entire Lizard Head Wilderness	No Lease	15,749	40	15,749	40	15,749	40	15,749	40	15,749	40	40,000	100	15,749	40	15,749	40
	Lease	10,534	26	10,534	26	10,534	26	10,534	26	10,534	26	0	0	10,534	26	10,534	26
	Lease without Surface Occupancy	13,717	34	13,717	34	13,717	34	13,717	34	13,717	34	0	0	13,717	34	13,717	34
	Total for Area	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100	40,000	100
Total South San Juan, Weminuche and Lizard Head Wildernesses	No Lease	434,688	68	430,547	67	432,540	68	430,679	67	431,208	67	636,687	100	433,752	68	432,540	68
	Lease	74,139	12	74,139	12	74,139	12	74,139	12	74,139	12	0	0	74,139	12	74,139	12
	Lease without Surface Occupancy	127,860	20	132,001	21	130,008	20	131,869	21	131,340	21	0	0	128,796	20	130,008	20
	Total for Area	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100	636,687	100

TABLE V

Estimated Base Water Yield in Existing Wildernesses (Thousand acre-feet per year)

Area	1980	1981-1985	1986-1990	1991-2000	2001-2010	2011-2020	2021-2030
ALL ALTERNATIVES							
Lizard Head							
San Juan	37.0	37.0	37.0	37.0	37.0	37.0	37.0
Uncompahgre	32.8	32.8	32.8	32.8	32.8	32.8	32.8
Weminuche							
San Juan	516.4	516.4	516.4	516.4	516.4	516.4	516.4
Rio Grande	219.1	219.1	219.1	219.1	219.1	219.1	219.1
South San Juan							
San Juan	68.2	68.2	68.2	68.2	68.2	68.2	68.2
Rio Grande	111.2	111.2	111.2	111.2	111.2	111.2	111.2
TOTAL	984.7	984.7	984.7	984.7	984.7	984.7	984.7

APPENDIX N

WILDERNESS STUDY AREA INFORMATION

OVERVIEW

This appendix presents detailed information on each of the three Wilderness Study Areas (WSA's) on the San Juan National Forest. The West Needle, Piedra, and South San Juan Wilderness Expansion Study Areas were established under the Colorado Wilderness Act of 1980 (P.L. 96-560). Under this Act, the Secretary of Agriculture is directed to review each WSA and make a recommendation by December 31, 1983, as to its suitability or unsuitability for inclusion in the National Wilderness Preservation System. The information given below is more detailed than that presented in the "Affected Environment" section (Chapter III) of the draft EIS, and is intended to portray biological, geographical, and physical characteristics in such a manner that an informed decision can be made concerning the wilderness status of each area.

WEST NEEDLE WILDERNESS STUDY AREA

VICINITY

The West Needle WSA is located in San Juan and La Plata Counties in southern Colorado between the towns of Durango and Silverton. The area consists of 21,580 acres of unroaded and undeveloped forest land of which 15,800 acres are in the National Forest System and 5,780 acres are administered by the Bureau of Land Management. The WSA falls under an Inter-Agency Cooperative Agreement dated July 1981 which designates the Forest Service as the lead agency in the study.

Figures I, II, and III show the location of the WSA in relation to the Four Corners Area (Colorado, Utah, New Mexico, and Arizona), nearby cities and other wildernesses. Table I lists the acres of existing wilderness within a 100-mile radius of the West Needle WSA.

PHYSICAL SETTING

VEGETATION

Vegetation on the WSA varies with elevation, which ranges from 8,000 feet to over 13,100 feet. Coniferous vegetation occurs over 40 percent of the area, with the dominant species being Engelmann spruce. Aspen stands, which occur on five percent of the area, are scattered throughout. The remainder of the area is mostly grassland and rock. Browse occurs on only a few areas, primarily at lower elevations. Thurber fescue is the most abundant type of vegetation in non-timbered areas. A variety of grasses and forbs is also found as understory vegetation and within grassland and wetland areas. Above timberline, rocklands and rock outcrops commonly preclude any vegetation. The higher peaks have a considerable amount of rock and soils, where they exist, are shallow. Table II lists the frequency of occurrence of various ecosystem types on the WSA in comparison with other wildernesses. The table indicates that the area is not unique with respect to vegetative composition. Lodgepole pine is common on the western side of the WSA in the area of the Lime Creek Burn, which occurred in 1879. This species, which is exotic to the area, was planted following the burn and is gradually being interspersed with naturally occurring spruce and fir.

Figure I Location Map Of The West Needle Wilderness Study Area

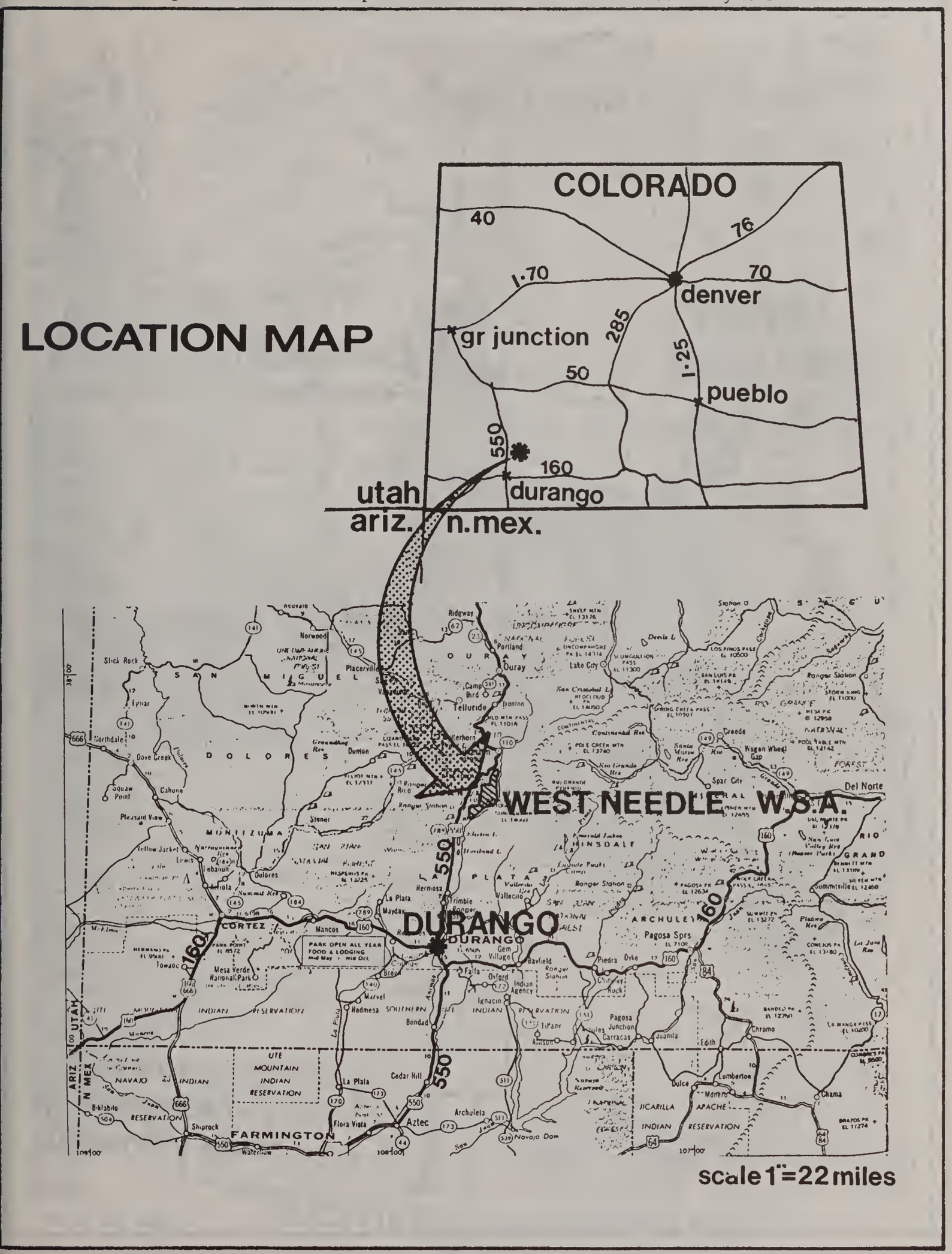


Figure II Detail Map Of The West Needle Wilderness Study Area

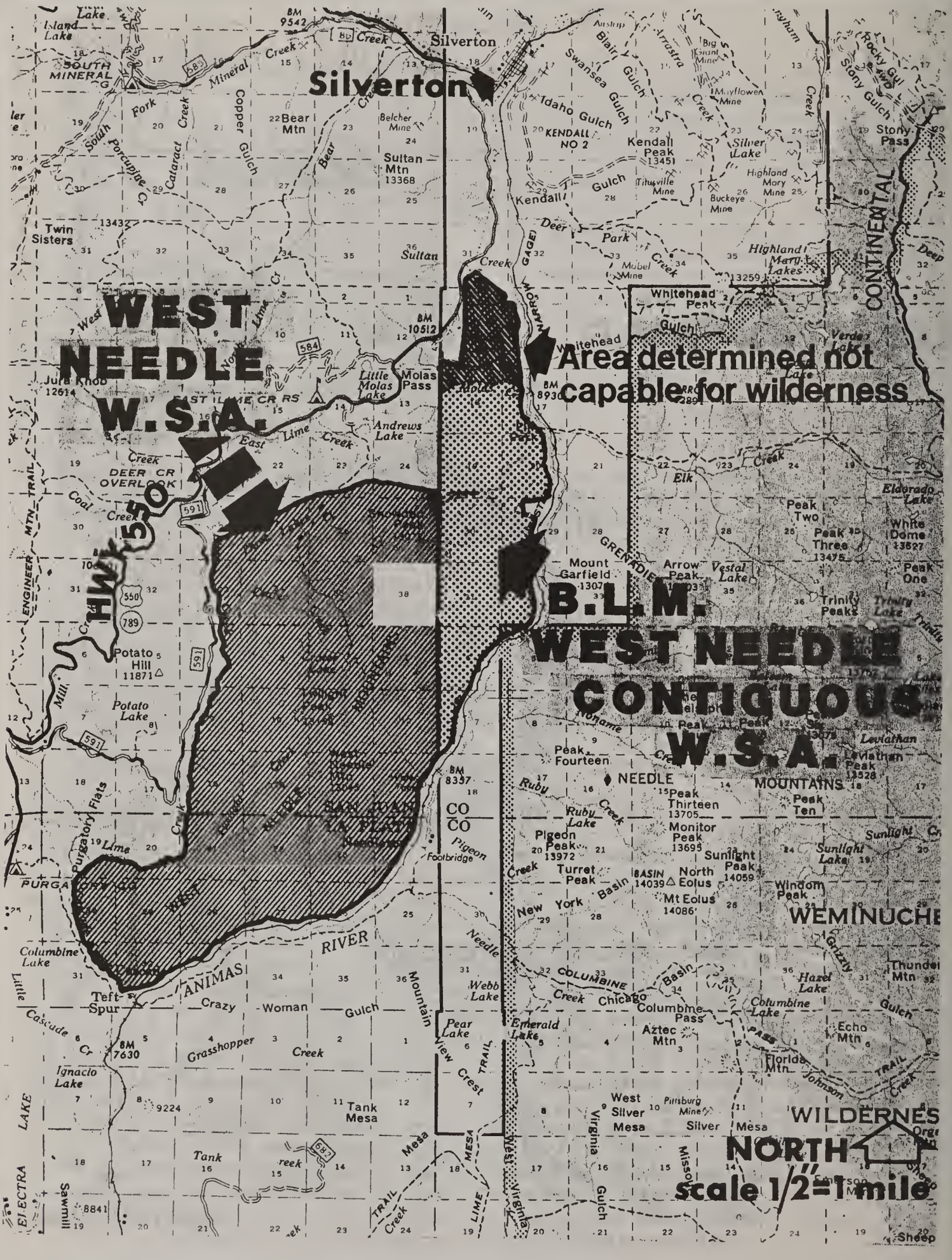


Figure III West Needle Wilderness Study Area and Nearby Wildernesses

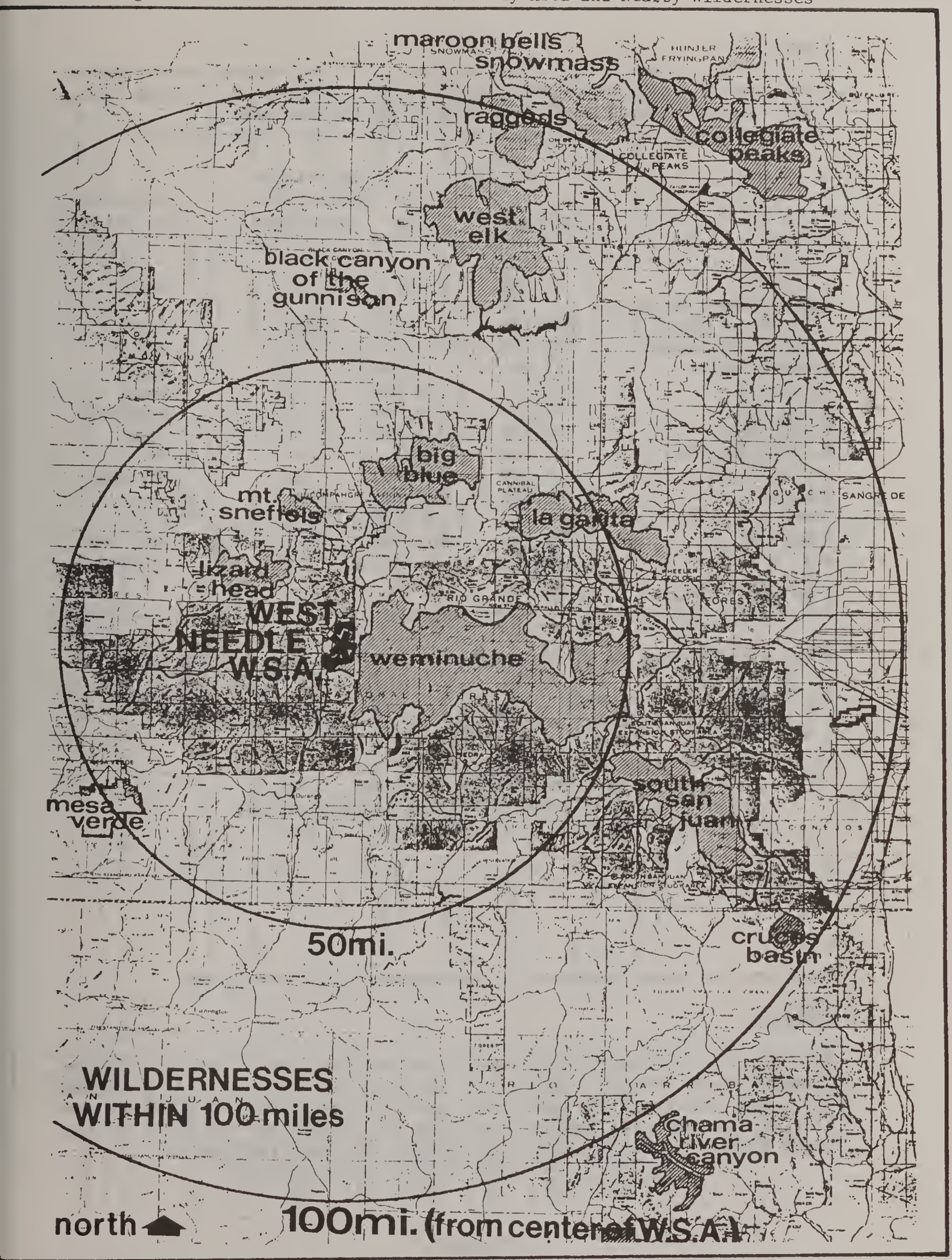


TABLE I

Wildernesses Within a 100-Mile Radius of West Needle WSA, Showing Size, Total Recreation Visitor Days, and Relative Use Ratings

	Acres	1980 Use	Recreation Visitor Days/ Acre/Year	Relative Use Rating
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Cruces Basin	18,000	1,600	.09	Low
La Garita	108,486	32,300	.30	Low
Lizard Head	40,000	21,000	.53	Moderate
Maroon Bells	174,329	130,900	.75	High
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Raggeds	68,000	19,000	.28	Low
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Total	1,303,605			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:

0-.35 Recreation Visitor Days/Acre/Year	Low
.36-.70 Recreation Visitor Days/Acre/Year	Moderate
.70+ Recreation Visitor Days/Acre/Year	High

There are no known threatened or endangered plants in the WSA.

LANDFORM

The WSA lies within what is called the San Juan uplift portion of the Southern Rocky Mountain Province. The area is characterized by rugged and steep terrain. The mountains have been uplifted and subjected to glacial erosion and shaping. The WSA is flanked on the east by the steep Animas Canyon and partly on the west by Lime Creek Canyon.

TABLE II

Representative Ecosystems in the West Needle Wilderness Study Area and Nearby Wildernesses

Ecosystem	West Needle WSA	Weminuche	South San Juan	Lizard Head	La Garita
ALPINE	Extensive	Common	Common	Common	Extensive
SUBALPINE	Common	Common	Common	Common	Common
SPRUCE-FIR	Uncommon	Common	Common	Uncommon	Common
DOUGLAS-FIR	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
ASPEN	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
PONDEROSA PINE	None	Uncommon	None	None	None
LODGEPOLE PINE	Uncommon	None	None	None	Uncommon

KEY

Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

GEOLOGY

The geological setting of the West Needle Wilderness Study Area consists mostly of Pre-Cambrian metamorphic and intrusive igneous rocks. Lower flanks of mountains and canyon walls are veneered with talus, landslide deposits, and thin gravels. Rocks of the western half of the WSA are metamorphosed lava flows, called Twilight Gneiss. The eastern half of the WSA consists of a variety of rock types. The Irving Formation, which includes metamorphosed volcanics and sediments crosses the southern two-thirds of the eastern half. The Tenmile Granite forms an intrusive mass along the eastern boundary of the WSA.

SOILS

Soil characteristics and production potentials within the WSA vary considerably as a function of landform, slope and parent material. Although there is only limited data on soils in the WSA, some general statements and assumptions can be made. Soils and landforms of the area can generally be classified into two groups, and these areas are described below:

Areas with smooth to moderately sloping terrain - These occur in the northwest and central mid-portions of the WSA. Soils range from shallow to moderately deep and are medium to coarse textured often times with gravel or cobble on the surface. They are mostly well drained but there are bog-like depressions associated with this area that remain wet and saturated most of the year. The soil is generally not very productive, and is best suited for water storage, wildlife habitat, grazing and recreational uses. These soils and landforms comprise approximately 40 percent of the WSA. The area has a low potential for surface erosion and mass wasting.

The remainder of the area, roughly 60 percent of the WSA, is made up of steep to very steep mountain and canyon sideslopes. The area is predominantely rockland, rock outcrop and talus slopes. Some areas contain very shallow loamy soil materials, supporting some vegetation in the form of grass or scattered trees. These areas however, are generally not capable of supporting commercial timber production. Erosion hazard is low, due to the proportion of bare rock, and soils are generally not erodable. The major hazards are rock falls and potentially unstable talus areas.

SOCIAL AND ECONOMIC SETTING

The West Needle Wilderness Study Area is located within the Animas Human Resource Unit (HRU), which is one of three areas of analysis within the primary zone of social and economic influence of the San Juan National Forest. The Animas HRU contains most of La Plata and San Juan Counties and a small portion of Hinsdale County. The population of San Juan County has remained stable at approximately 850 people over the past 20 years, most of whom live in Silverton. Population of La Plata County, which includes Durango, grew from 19,200 to 27,100 between 1970 and 1980, for an increase of over 40 percent. That portion of Hinsdale County within the HRU is largely uninhabited.

Per capita income in the HRU averaged $5,920 in 1978. Unemployment in 1980 averaged 3.5 percent, although under-employment remains a chronic problem because of the large number of trained and educated individuals who migrate to the area because of its perceived quality of life rather than its employment opportunities.

Lifestyle - The Animas HRU is moderately urbanized in the Durango area, but a rural mountain lifestyle prevails in Silverton and in most other areas. In both of these towns lifestyles for many are centered around a seasonal tourist economy. The majority of the workforce is employed in retail and tourist-related business; skilled trades such as construction, agriculture, and logging; and in white-collar professions such as public administration and education. Oil and gas exploration and drilling and hard-rock mining, as well as construction and tourism, are growing areas of employment. A large proportion of the residents of the HRU spend at least some of their leisure time in the Forest.

Attitudes, Beliefs and Values - This HRU has a mix of residents with a wide range of attitudes, beliefs, and political philosophy. At one end of the spectrum are those who believe strongly in individual rights and oppose interference from government at all levels. At the other end of the spectrum are those who believe that government can and should be used to solve social and community problems. The community within the HRU is easily polarized on issues, including those related to natural resource management.

Social Organization - The standard social services available in most small American cities are found in Durango, including a four-year college. Because of its diverse population and economic base, the Animas HRU is not as vulnerable to social disruption from specific projects such as mineral or ski area development as other communities in southwest Colorado might be.

Population and Land Uses - Population increases of the past decade have created problems resulting from the conversion of agricultural lands to residential and commercial uses. Recreational use of the National Forest is growing along with population increases, with much of the activity taking place on Forest lands within the Animas HRU.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Dispersed Recreation

There are no developed recreation sites within the West Needle WSA, and no recreational structures other than trails. Current use, approximately 8,000 RVD's annually over the 20,340 acres (0.39 RVD's per acre), is relatively low compared to other nearby wildernesses and dispersed recreation areas in the San Juan National Forest.

Current recreation activities include fishing, hiking, horseback riding, big game hunting, viewing scenery, cross-country skiing, and mountain climbing. Other activities occurring in limited amounts include some

snowmobile travel and motorcycle riding on trails. Virtually all recreation opportunities in the West Needle WSA are of the semi-primitive non-motorized type.

Visual Resource

The landscape of the WSA is dominated by topographic features including sharp peaks, glacial remnants, cirque basins, and rugged, steep cliffs. Talus slopes and avalanche chutes are common. Vegetation is mainly alpine and sub-alpine intermixed at lower elevations with deciduous and coniferous trees and large natural openings. Vegetation contrasts in form and color with barren rock and talus slopes. Waterforms include small alpine lakes, ponds, dispersed wet meadows, and small streams, some of which cascade from sheer rock walls. About 60 percent of the WSA is classified as having distinctive or outstanding scenic quality. The remainder is common to the characteristic alpine landscape of the area.

Cultural Resource

Although no archaeological field surveys have been undertaken for the WSA, it is possible that remnants of some small prehistoric camps exist. It is unlikely that archaeological remains are numerous due to the rugged topography and extreme climatic conditions which would not have been conducive to long-term use by native peoples. Generally the WSA is considered to have low archaeological sensitivity.

One important historic property exists in the vicinity. The former Denver and Rio Grande Western Railroad from Durango to Silverton, which is now operated as a tourist attraction by the Durango and Silverton Narrow Gauge Railroad, runs along the eastern and southern boundary of the WSA. It is listed on the National Register of Historic Places and is designated a National Historic Landmark by the U. S. Department of the Interior. No other significant historic properties are known to exist within the WSA, which is considered to be of low historic sensitivity for much the same reasons as cited for archaeological sensitivity.

The WSA is situated in the historic territory of the Ute Indians. Archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes, however, have failed to identify any specific sites important to the Ute peoples within the WSA.

WILDERNESS

The West Needle WSA is primarily natural in character, and there are no known "imprints of man." Portions of the area have been used for grazing of domestic livestock, but this is not evident to the casual observer.

Outstanding opportunities for unconfined recreation within an unmodified environment are afforded. The WSA has rugged mountains, numerous side canyons with enclosed cirque basins, and abundant wildlife. These features are attractive to hikers, backpackers, fishermen, hunters,

mountain climbers and cross-country skiers. Because of the varied terrain and vegetative composition, as well as the large area of contiguous wildlands, the area offers outstanding opportunities for solitude.

FISH AND WILDLIFE

Big Game

Big game species presently found in the West Needle WSA include elk, mule deer, Rocky Mountain goat, Rocky Mountain bighorn sheep, black bear and possibly mountain lion. All species use the area primarily as spring, summer, and fall habitat, although mountain goat, bighorn sheep, and black bear make limited use of the area during winter months.

Small Game

Among the small game species inhabiting the WSA are snowshoe hare, blue grouse and white-tailed ptarmigan.

Non-game

Numerous song birds, raptors, and mammals normally found in coniferous forests and subalpine and alpine regions of Colorado inhabit the WSA. Commonly observed species include pika, marmot, Canada jay, goshawk, coyote, weasel and pine grosbeak. Because of its rugged terrain and remote conditions, a large portion of the area is considered to be acceptable wolverine habitat.

Threatened and Endangered (T&E) Species

There are no known listed T&E species presently inhabiting the WSA. The wolverine is on the Colorado list of threatened species, but it is not known to inhabit the area even though acceptable habitat is present. Habitat for pine marten, a species of limited population, is also found within the WSA.

Fish

Cutthroat, rainbow and brook trout are found in several of the lakes and streams within the WSA. A very limited amount of natural reproduction occurs in streams. Such populations are sustained by periodic restocking by the Colorado Division of Wildlife and by fish escaping from lake populations. Many of the streams in the area do not support fish because of steep gradients and extreme fluctuations of flow.

RANGE

Range activity on the West Needle WSA is limited mainly to domestic sheep grazing which is authorized on about two-thirds of the WSA. Due to the steepness of the terrain, almost thirty percent of the authorized area is not grazed. Some grazing by horses for recreational activity also occurs.

Most of the range is in "fair" or better condition, and productivity ranges from average to below average for the Forest. Current annual grazing use on both the Forest Service and BLM portions of the WSA is approximately 590 animal unit months (AUM's). Of this, 360 AUM's are permitted on the total unadjusted BLM portion of the WSA. On the BLM portion north of Molas Creek that is determined not suitable because of manageability constraints, permitted grazing use is approximately 40 AUM's per year. There are portions of two sheep allotments in this area, both of which are under extensive management.

On Forest Service land, there are portions of three sheep allotments, two of which are extensively managed and one of which is currently being managed for recreation horses and big game.

TIMBER

Of the 20,340 acres within the WSA, 19 percent (3,808 acres) is classified as forest land capable for timber production. Sixty-nine percent of the capable forest land has sawtimber size trees. The predominant timber type is spruce-fir which covers eighty-four percent of the capable forest land. The distribution by timber type and size class is shown in the table below.

Area Capable of Timber Production by Type and Stand Size Class (Acres)

Timber Type	Stand Size Class: Non-stocked	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	-	-	-	-	0
Spruce-fir	-	-	1,168	2,045	3,213
Douglas-fir	-	-	-	115	115
Aspen	-	-	-	480	480
Total	0	0	1,168	2,640	3,808

The current timber inventory on capable forest lands is 10.9 million cubic feet or 37.3 million board feet. Most inventory volume is in the spruce-fir type and almost all capable forest land occurs on slopes between 30 and 60 percent. The distribution of inventory volume is shown in the table below.

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	0	0
Spruce-fir	9.7	33.8
Douglas-fir	0.3	1.0
Aspen	0.9	2.5
Total	10.9	37.3

Timber productivity on the West Needle WSA ranges from average to somewhat below average for the Forest. The WSA is characterized by rugged terrain, and many areas would be inaccessible from the standpoint of an economically efficient timber management program. Timber stands are widely scattered throughout the WSA.

WATER

Water Yield

Water yield from the West Needle WSA is estimated at 33,800 acre-feet per year or 1.66 acre-feet/acre/year. The eastern part of the WSA drains into the Animas River via several short, steep, ephemeral drainages. Molas Creek, along the eastern part, is the only perennial stream. The western portion of the WSA is drained by tributaries to Lime Creek including Crater Creek and Twilight Creek. Water uses within the WSA include wildlife and livestock drinking, fishing, scenic viewing and maintenance of riparian and aquatic habitat. Downstream water uses on the Animas River include a wide variety of both domestic and agricultural uses.

At present, no water resource measurement sites are located within the WSA.

Water Quality

No specific water quality data is presently available for the WSA, although the predominantly Precambrian parent material (gneiss, quartzite, schist) commonly produces high quality water low in both dissolved substances and sediment.

MINERALS

Mining and Mineral Leasing Activity

Current mining activity, which is limited to a number of unpatented mining claims, is minimal. There have been no recent surface disturbing mineral exploration activities that would require an operating plan, although the BLM portion of the WSA borders an active uranium mine. There are no applications or existing leases for leasable minerals in the WSA.

Current mineral activity is summarized in the following table.

Activity (As of April 30, 1982)	Number	Acres
Patented Mining Claims	0	0
Unpatented Mining Claims	502	10,040
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	0	0
Federal Oil & Gas Leases	0	0

Of the 502 unpatented mining claims, 31 are located in the area north of Molas Creek. These comprise approximately 620 acres.

Mineral Potential

The potential for locatable and leasable minerals in the WSA is summarized in the table below.

Area rated as having high/moderate potential for:	Acres	Percent of Study Area
Locatable minerals	20,210	94
Leasable minerals	0	0

The combined rating of "high/moderate potential" in the above table includes a range of possible situations, from areas having favorable geology and structure with considerable field activity to areas having only sub-economic deposits with occasional activity.

Precious and base metals have been successfully mined from deposits several miles to the north and northeast of the WSA. While no economic ore has yet been discovered within the WSA, the potential exists for precious and base metal occurrences.

Uranium deposits occur within fault zones at Elk Park. In addition, uranium potential exists across the northern portion of the WSA, including the BLM contiguous portion.

Tungsten and cobalt prospects exist in BLM lands adjacent to the WSA. These minerals have been classified as strategic and critical by the U. S. Bureau of Mines.

Geological Survey - Bureau of Mines

A Geological Survey - Bureau of Mines Mineral Study is planned for the summer of 1982. Currently, published geologic maps and reports are the only sources of mineral information for the WSA.

LANDS

Land Ownership

Total land area within the West Needle Wilderness Study Area consists of approximately 15,800 acres administered by the Forest Service and 5,780 acres administered by the BLM. On the BLM portion, approximately 1,240 acres are in the area north of Molas Creek. One section (640 acres) is owned by the State of Colorado including all surface and mineral rights. This section is completely surrounded by Forest Service and BLM land, and has been identified as highly desirable for acquisition by the Forest Service.

A Bill (H. R. 3433) has been submitted to the Congress that would modify the boundary of the San Juan National Forest. If passed, this Bill would transfer the area of the West Needle Contiguous WSA south of Molas Creek to the Forest Service. The entire WSA, excluding the area determined unsuitable for wilderness management, would then be under Forest Service administration.

Special Land Uses

There are no improvements under special land use permits.

Power Withdrawals

Approximately 2,260 acres within the Forest Service portion and 1,650 acres within the BLM portion are encumbered by power-site withdrawals (Power Site Classification No. 219 and Executive Order of July 2, 1910

respectively), although there are no existing plans to develop these areas for power generation. The Federal Energy Regulatory Commission is scheduled to review these withdrawals for possible revocation within the next three years.

Proposed Impoundments

No existing or proposed impoundments, irrigation reservoirs, or distribution systems are located within the WSA. No decreed water rights exist according to Colorado Water Resource Division records.

FACILITIES

The West Needle Wilderness Study Area contains no facilities other than trails. These are maintained by the Forest Service and are used principally for recreation and to a minor degree, for livestock management. The Molas Trail, (Forest Trail 665) traverses from U.S. Highway 550 to the Animas River, passing through the extreme northern portion of the WSA. The Crater Lake Trail (Forest Trail 623) accesses the central portion of the WSA from Andrews Lake, which is located adjacent to U.S. Highway 550. This trail terminates at Crater Lake. Total length of trails within the WSA is approximately 5.5 miles.

Road access to the West Needle Wilderness Study area is provided via U.S. Highway 550 which is an all weather route between Durango and Silverton. The Lime Creek Road (Forest Road 591), which joins U.S. Highway 550 in two places, borders approximately five miles of the southwestern edge of the WSA. The Cascade Creek Trail (Forest Trail 510) borders the extreme southwestern edge of the WSA.

PROTECTION

Air Quality

The West Needle WSA is designated a Class II air quality area. This classification allows only moderate degradation over baseline concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems represented within the WSA. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. In recent years, natural fire has generally been excluded from the area through intensive control and suppression efforts, although some man-caused fires have occurred along the eastern boundary of the WSA in association with the narrow gauge railroad. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

PIEDRA WILDERNESS STUDY AREA

VICINITY

The Piedra WSA is located in Archuleta and Hinsdale Counties in southern Colorado between the towns of Durango and Pagosa Springs. The area consists of 41,500 acres of unroaded and undeveloped forest land. Figures IV, V, and VI show the location of the WSA in relation to the Four Corners Area, (Colorado, New Mexico, Utah, and Arizona), nearby cities, and other wildernesses. Table III lists the acres of existing wildernesses within a 100-mile radius of the Piedra WSA.

PHYSICAL SETTING

VEGETATION

Vegetation on the area varies with elevation, which ranges from 6,800 to 10,500 feet. Coniferous vegetation occurs over 70 percent of the area with the Douglas-fir type being most predominant (50 percent of total area); spruce-fir is second (17 percent of total area); and ponderosa pine, although common at lower elevations, is the least common coniferous type (three percent of total area). Aspen stands are scattered throughout, and these cover approximately 25 percent of the total area. Table IV, which lists frequency of occurrence of various ecosystem types on the Piedra WSA in comparison with other wildernesses, points out the uniqueness of the vegetation composition of the Piedra WSA. Alpine and subalpine types, which are common on the other four areas, are not represented on the Piedra WSA. Conversely, Douglas-fir and aspen types, which are uncommon on all four other areas, are extensive or common on the Piedra WSA.

The non-timbered portion of the study area (five percent) is covered by grasses, rock, or riparian vegetation. Browse is represented in only a few scattered areas mostly at lower elevations. There are no known threatened or endangered plants present.

LANDFORM

The area lies on the northern edge of the Navajo Section of the Colorado Plateau. The general landform is characterized by south-facing slopes that are deeply dissected by the Piedra River and associated side drainages. A few isolated plateau-like areas are scattered throughout. The Piedra River is the dominant drainage feature of the WSA.

GEOLOGY

The geological setting of the Piedra Wilderness Study Area (WSA) consists of a sequence of sedimentary rock layers overlying a Precambrian basement of granite and quartzite. One major and several minor northwest-trending faults cut the entire sequence of rocks. The sedimentary series of rocks is made up of about 2,600 feet of limestones, sandstones, siltstones and shales ranging in age from Cambrian to Early Cretaceous. The sequence is exposed in several canyons, most notably that of the Piedra River. Portions of the Piedra canyon floor

Figure IV Location Map Of The Piedra Wilderness Study Area

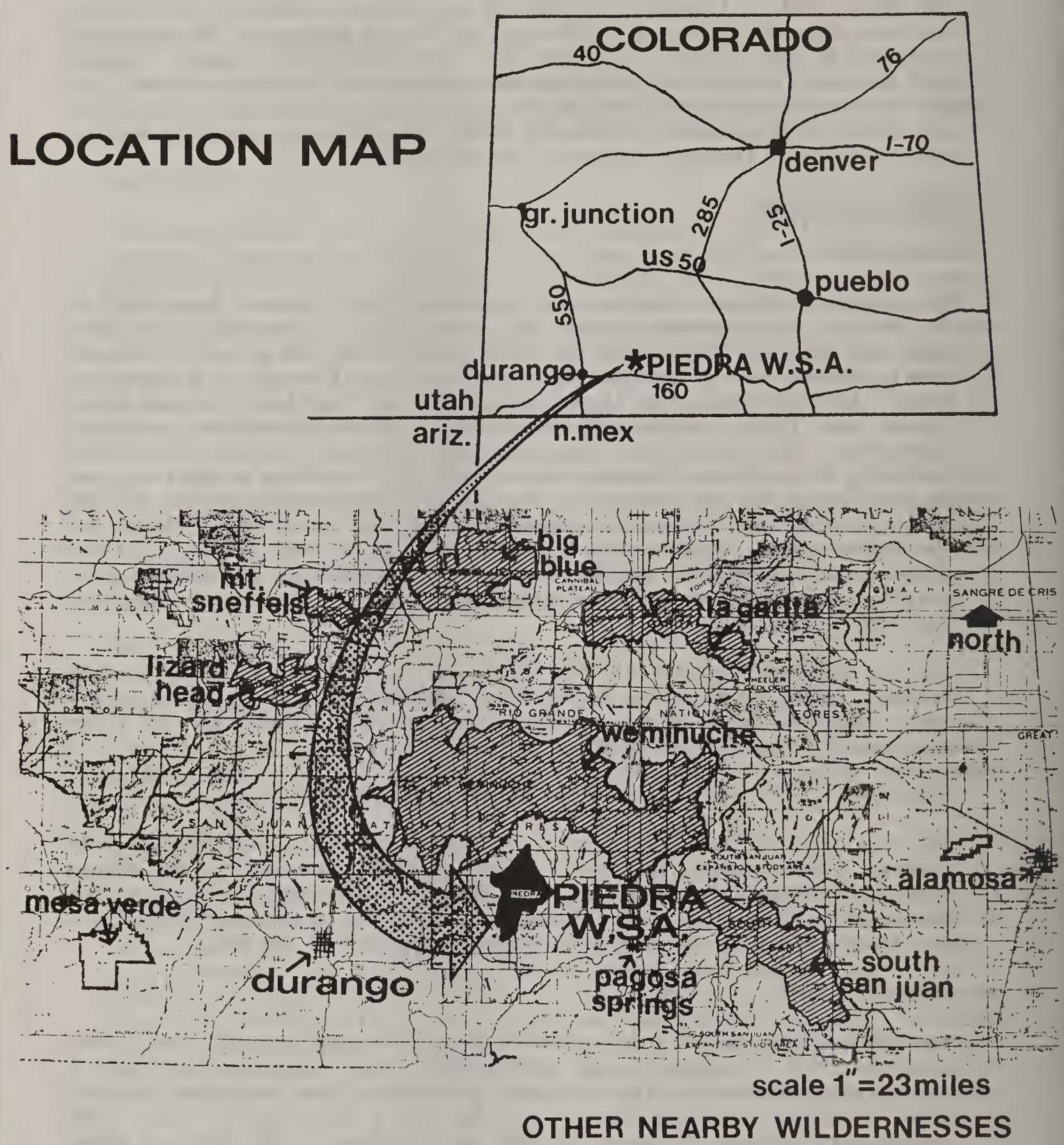


Figure V Detail Map Of The Piedra Wilderness Study Area



Figure VI Piedra Wilderness Study Area and Nearby Wildernesses

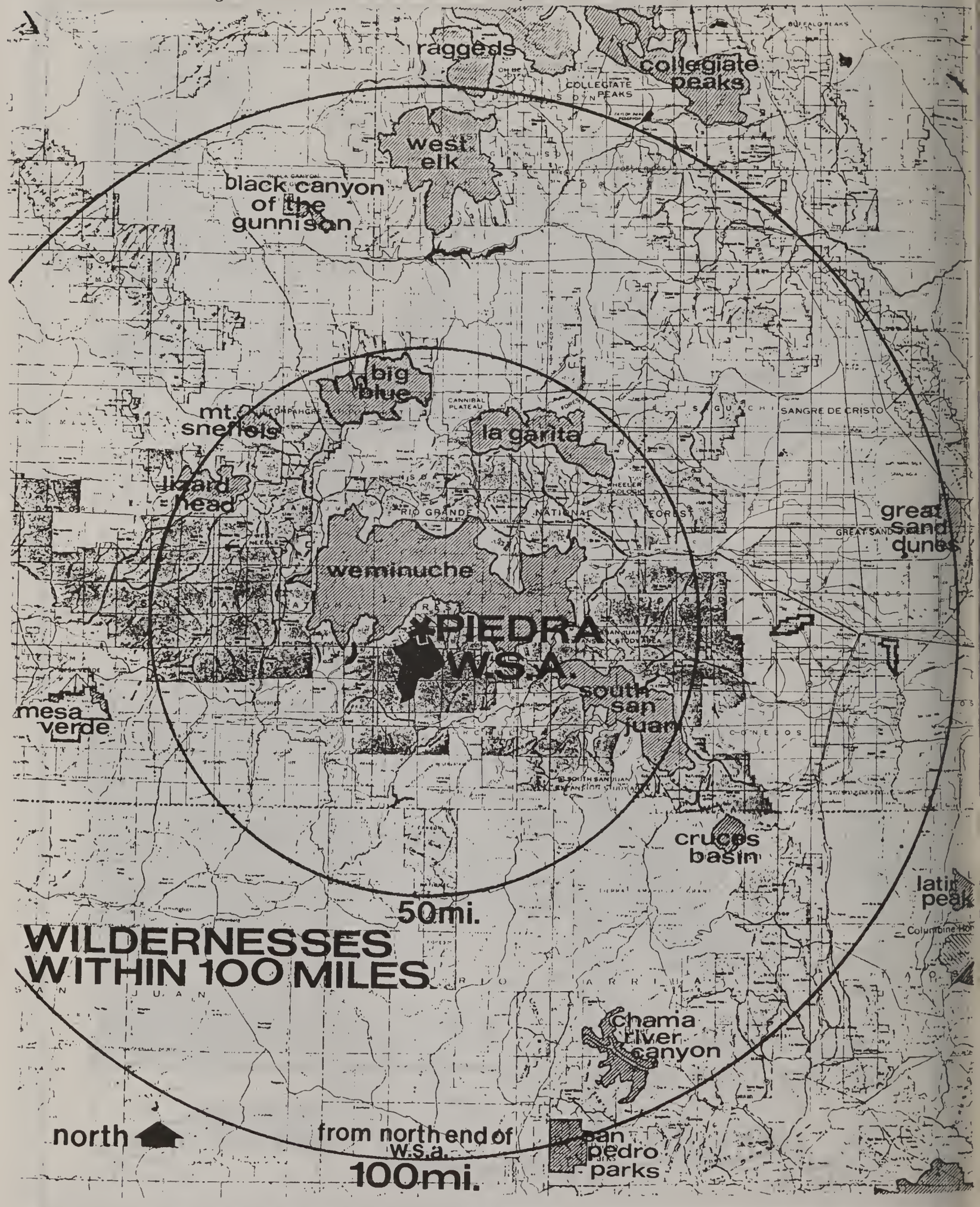


TABLE III

Wildernesses Within a 100-Mile Radius of Piedra WSA, Showing Size, Total Recreation Visitor Days and Relative Use Ratings

	Acres	1980 Use	Recreation Visitor Days Acre/Year	Relative Use Rating
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Cruces Basin	18,000	1,600	.09	Low
Great Sand Dunes (NPS)	33,450	NA	NA	Low*
La Garita	108,486	32,300	.30	Low
Latir Peak	20,000	1,500	.08	Low
Lizard Head	40,000	21,000	.53	Moderate
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Raggeds	68,000	19,000	.28	Low
San Pedro Parks	41,130	50,200	1.22	High
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Total	1,303,605			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:

0-.35 Recreation Visitor Days/Acre/Year	Low
.36-.70 Recreation Visitor Day's/Acre/Year	Moderate
.70+ Recreation Visitor Day's/Acre/Year	High

contain exposures of the Precambrian granite and quartzite; most canyons have been cut into the lowest sedimentary formation overlying the Precambrian rocks and are enclosed by walls of limestone ledges and slopes of softer rock and soil. Areas between the stream valleys consist of moderate to steep slopes and ridges, capped by hard sandstone in the northern part of the WSA and topped by less resistant sandstone and siltstone to the south. Slopes throughout the WSA are unstable and subject to failure ranging from rockfall in most of the area to landslides, mudslides, and soil creep in small, particularly hazardous areas. There are no known intrusive igneous rocks or volcanic rocks within the WSA.

TABLE IV

Representative Ecosystems in the Piedra Wilderness Study Area and Nearby Wildernesses

Ecosystem	Piedra WSA	Weminuche	South San Juan	Lizard Head	La Garita
ALPINE	None	Common	Common	Common	Extensive
SUBALPINE	None	Common	Common	Common	Common
SPRUCE-FIR	Common	Common	Common	Uncommon	Common
DOUGLAS-FIR	Extensive	Uncommon	Uncommon	Uncommon	Uncommon
ASPEN	Common	Uncommon	Uncommon	Uncommon	Uncommon
PONDEROSA PINE	Uncommon	Uncommon	None	None	None
LODGEPOLE PINE	None	None	None	None	Uncommon

KEY

Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

SOILS

Soil productivity varies considerably within the WSA as a function of landform, slope, and parent material. The Soil Survey of the Piedra Area, Colorado, (Bauer, R.F. USDA Soil Conservation Service and Forest Service, April, 1981) has identified three major soils series comprising about 75 percent of the Piedra WSA. These are:

The Carracas Soils - These soils occur mainly in the southern portion of the area, on ridge tops and steep canyon sideslopes. They are medium textured, forming from materials weathered from the interbedded shale and sandstone of the area. These soils have low inherent fertility level and are not very productive from a range or timber standpoint. Due to slope and runoff characteristics, they will erode easily if disturbed. They will not vegetate readily due to low fertility levels and the low rainfall zone in which they are found.

The Chris Soils - These soils make up a major portion of the area and occur on the steep canyon sides in the central and northern portions of the unit. They are deep soils with gravely or stony loams over clayey textured subsoils. Depth to sandstone or shale varies from 40 to 80 inches. They also are forming from shales and sandstones in the area. These soils have limited timber productivity. Neither are they very productive from a range standpoint. Erosion hazard is high, and most importantly, these soils are prone to mass slumping and sliding.

The Dunton Soils - These soils occur on the lesser sloping upland areas. They are moderately deep, medium to fine textured soils that have developed over sandstone. Depth to hard sandstone bedrock varies from 30 to 40 inches. These soils are fairly productive from a timber and range standpoint. Erosion is usually not a serious problem, but these soils are easily compacted when wet. They have a high windthrow hazard and reforestation can be rather difficult.

Included among the soils described above are bare rock outcrops of shale, sandstone, and interbedded shales and sandstones. These areas are typically on extremely steep slopes and support little or no vegetation.

SOCIAL AND ECONOMIC SETTING

The Piedra Wilderness Study Area is within the Pagosa Human Resource Unit (HRU), one of three areas of analysis within the area of social and economic influence of the San Juan National Forest. This area, along with the Animas and Montelores HRU's, was delineated to assist in designing management actions that would be responsive to local issues, conditions and needs. The Pagosa HRU contains portions of Hinsdale and Mineral Counties, and virtually all of Archuleta County.

POPULATION, EMPLOYMENT, AND INCOME

Archuleta County's population grew by 33 percent between 1970 and 1980, from 2,733 to 3,631. State projections call for the population to double by the year 2010. Employment in the area is primarily in ranching, logging, retail trade and tourism sectors; therefore, much of this employment is seasonal. Unemployment, a chronic problem, was nearly 12 percent in 1980. The average per-capita income in Archuleta County in 1980 was $5,222.

LIFESTYLE

The predominant lifestyle in the Pagosa HRU is characterized by its rural mountain setting, with many of the residents dependent on the National Forest for part or all of their livelihoods. Ranching, logging and tourism, including outfitter-guide operations, are all occupations closely associated with management of the Forest. Many newer residents of the HRU are either retirees or "emigrants" from urban areas who moved to the area specifically to enjoy the rural mountain lifestyle. These newer residents tend to be more oriented toward recreational uses of the National Forest rather than toward commodity production.

ATTITUDES, BELIEFS, AND VALUES

Public awareness of the recreational environment of the National Forest is increasing with immigration to the area. There is a changing public attitude toward protecting and preserving rather than developing and using Forest resources such as timber, forage and minerals. In the future, direct conflicts can be anticipated between those who hold "preservation" attitudes and those who believe resources should be developed to meet local income and employment needs.

SOCIAL ORGANIZATION

While most of the community services found in other areas are available in the Pagosa HRU, rapidly rising populations are placing strains on school systems, medical facilities, street and road maintenance, and law enforcement capabilities.

POPULATION AND LAND USE

Until a few years ago, Hispanics constituted a majority of Archuleta County's population. Recent population growth has changed this mix, but the Hispanic influence is still extremely strong. Population growth has created a significant shift in land uses, with increasing conversions of ranchland into housing subdivisions and resorts.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Developed recreation within the area is non-existent as there are no structures and no developments other than 55 miles of trails. Dispersed

recreation use is light. Current use, which is approximately 6,100 recreation visitor days (RVD's) annually over the 41,500 acre area (0.15 RVD's per acre per year) is low compared to other wildernesses and dispersed recreation areas in the San Juan National Forest.

Recreation activities include big game hunting, fishing, hiking, horseback riding (with associated camping), viewing scenery, nature study, and cross-country skiing. Other activities occur in limited amounts, including river rafting, kayaking, and motorcycle riding on trails.

The Piedra WSA has 21,700 acres available for primitive recreation opportunities and 19,800 acres available for semi-primitive non-motorized opportunities. Current use is approximately 12 percent of capacity.

Visual Resource

Visual resources of the area are moderately varied resulting from the preponderance of broad slopes and valleys with lateral canyons. Aspen and other vegetation form colorful displays during the fall that add contrast among dark spruce and fir. The Piedra River Canyon contains a variety of rapids, pools, and small waterfalls and constitutes the outstanding visual feature of the area. Water is clear with a high degree of clarity except following heavy rains. About 10 percent of the WSA can be characterized as having distinctive or outstanding scenic quality. The remainder is common and similar to the landscape characteristics of the surrounding area.

Cultural Resource

Although no extensive cultural resource surveys have been undertaken in the WSA, one significant archaeological site, an aboriginal camp, has been identified. Other camps may be discovered in the area although it is unlikely that finds will be numerous or that any structural ruins exist. The area was apparently not desirable for permanent settlement by native peoples. No important historic properties are known to exist either within or in the vicinity of the WSA. Generally, the area is considered to be of low historical interest.

The WSA is situated in the historic territory of the Ute Indians, but archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes have failed to identify any specific sites important to the Ute peoples.

WILDERNESS

The Piedra WSA is primarily natural in character. There are no major "imprints of man" that would require rehabilitation. Portions of the area have been used for grazing of livestock, but this is not evident to the casual observer. The area provides opportunities for primitive recreation at elevations between 6,800 and 10,500, far lower than most designated wildernesses in Colorado. The WSA also has numerous broad

slopes with open parks, and many streams which are attractive to fishermen, hunters, horseback riders and hikers. Many opportunities for solitude exist, although along the Piedra or Sand Creek Trails use can be heavy at times.

FISH AND WILDLIFE

Big Game

Big game species within the area include elk, mule deer, black bear and mountain lion. Primary use is for spring-summer and fall range. However, isolated south and west facing slopes are used as winter range by deer and elk, especially during years of light snowfall. Many of the open points and ridges are considered suitable elk calving areas by the Colorado Division of Wildlife. The area includes an important migration corridor between summer and winter range for deer and elk.

Small Game

Small game species occupying the area include cottontail, band-tailed pigeon, snowshoe hare, and blue grouse. Low-elevation pine areas provide habitat for Abert's squirrel, and the area is well populated with them. Turkeys are reported on First Fork Creek, and mallard and cinnamon teal ducks are occasionally observed.

Non-game and Furbearers

Various song birds, raptors, and small mammals are common. Observed species include chipmunk, pine squirrel, ground squirrel, badger, coyote, weasel, porcupine, pine marten, marmot, bobcat, raven, gray jay, mountain bluebird, beaver, and water ouzel.

Threatened and Endangered Species

There are no known federally-listed threatened or endangered species presently occupying the unit. River otter, a species listed by the State of Colorado as threatened, was reintroduced in 1978. The initial transplant site was at the mouth of Sand Creek on the Piedra River which lies within the WSA. Reintrodution plans call for continuing transplants. Acceptable habitat is located along the Piedra River and most of the larger tributary streams. A limited amount of grizzly bear habitat exists, although there is generally not enough wet feeding areas for good quality habitat. One possible nesting site for peregrine falcon exists at the south end of the WSA, but it is presently unoccupied.

Suitable habitat for wolverine, another species listed as threatened by the State of Colorado, also exists within the area, although no confirmed sightings have been reported.

Fish

The Piedra River and its major tributaries within the WSA provide cold water fish habitat ranging from fair to excellent quality. Included are cutthroat, rainbow, brown, and brook trout, although not generally in mixed populations.

In addition, the Piedra River contains non-game fish, including dace, sculpin, and suckers. Tributaries of First Fork Creek support the Snake River variety of cutthroat trout. Although several streams in the area contain habitat suitable for natural reproduction, periodic stocking is necessary to maintain fishable populations under present harvest regulations.

RANGE

Cattle and recreation horses graze approximately 70 percent of the area, with concentrations of grazing areas along drainages and bottoms. Most range is in satisfactory condition. There are nine spring developments and four miles of drift fences in the southern half of the area. Current livestock grazing is 2,860 animal unit months per year, and occurs on portions of five different allotments. Four of these are cattle allotments and one is a sheep allotment, which is currently vacant. Of the cattle allotments, three are intensively grazed (deferred and rest-rotation systems) and one is extensively grazed under a continuous grazing system.

TIMBER

Of the 41,500 acres within the WSA, 40,018 acres or 96 percent is classified as "capable" of timber production. Capable forest land is defined as land having the biological growing potential to produce at least twenty cubic feet of wood per acre per year. Ninety-five percent of the capable timber land is sawtimber. Productivity of this land ranges from average to below average for the Forest, and no harvesting has taken place in the WSA. The predominant timber type is Douglas-fir which covers 52 percent of the capable forest land. The distribution by timber type and size class is shown below.

Acres Capable of Timber Production by Type and Stand Size Class

Timber Type	Stand Size Class				
	Non-stocked (0-300 trees per acre)	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	37	-	295	692	1,024
Spruce-fir	-	7	1,604	5,453	7,064
Douglas-fir	-	-	258	20,728	20,986
Aspen	-	-	-	10,944	10,944
Total	37	7	2,157	37,817	40,018

The current inventory on capable forest lands is 89.9 million cubic feet or 309 million board feet of timber. Most volume is in the Douglas-fir type. The distribution of inventory volume is shown below.

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	1.5	4.1
Spruce-fir	23.7	90.2
Douglas-fir	43.8	186.2
Aspen	20.9	28.5
Total	89.9	309.0

Capable forest land occurs on all slopes, although over half (52 percent) occurs on 30 to 60 percent slopes. This breakdown is shown below.

Capable Forest Land Acres by Type and Slope Class

	Slope Class			
Type	Less than 30%	30 - 60%	More than 60%	Total
Ponderosa pine	70	907	47	1,024
Spruce-Fir	2,513	4,462	89	7,064
Douglas-fir	7,683	9,953	3,350	20,986
Aspen	4,735	5,350	859	10,944
Total	15,001	20,672	4,345	40,018

WATER

Water Yield

Water yield is estimated at 41,500 acre-feet on an average annual basis or one acre-foot/acre/year. All of this water drains into the Piedra River which flows through the WSA. Primary tributaries of the Piedra

River within the WSA include First Fork, Sand Creek, Sheep Creek, and Indian Creek. Although the Piedra River is the major river of the WSA, a major portion of its flow is generated from tributaries upstream from the WSA. Consumptive water uses within the WSA include water developments for domestic livestock and wildlife. Non-consumptive uses of water include fishing, river floating, and maintenance of aquatic and riparian habitat. Outside of the Piedra WSA, upstream and downstream uses of water from the Piedra River include pasture irrigation, livestock and wildlife drinking, and domestic home use. Non-consumptive uses include fishing and aquatic-riparian habitat maintenance.

Water Quality

Water quality within the Piedra WSA was monitored during 1975 in preparation for the Piedra Wild and Scenic River Study (Sullivan, Water Quality Survey of the Piedra River, San Juan National Forest, p. 69, 1975). Data from 17 stations (six in the WSA) indicate good to excellent water quality and compliance with State of Colorado water quality standards.

MINERALS

Mining and Mineral Leasing Activity

Mining and mineral leasing activity in the Piedra WSA is at relatively low levels. The following table summarizes current mineral activity:

Activity Type (As of April 30, 1982)	Number	Acres
Patented Mining Claims	0	0
Unpatented Mining Claims	12	240
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	5	1024
Federal Oil & Gas Leases	0	0

Unpatented mining claims located between 1966 and 1968 may contain uranium deposits. About 1,000 acres in the extreme southern tip of the WSA and about 25 acres along the western edge are presently under application for Federal oil and gas leases. Five lease tracts have been applied for but no leases have been issued and no geophysical exploration activity has been proposed.

Mineral Potential

The potential for significant development of locatable and leasable minerals in the WSA is relatively low. This is evidenced in part by the low level of exploration activity taking place. The following table summarizes potential for locatable and leasable minerals in the WSA:

Area Rated As Having High/Moderate Potential for:	Acres	Percent of Study Area
Locatable minerals	910	2.2
Leasable minerals	1450	3.5

Of the locatable and leasable minerals occurring within the area, those most likely to be economically recoverable include uranium, oil and gas, limestone, gravel, and geothermal resources. Uranium may occur in sandstones and limestones along the north, east, and southeast edges of the WSA. The most probable areas are located in the north, where present mining claims are staked, and to the southeast, just outside the WSA boundary.

The potential for oil and gas exists in the southern portion of the WSA. Four lease applications are pending on the southern portion and one on the western boundary of the WSA. No drilling or geophysical exploration activity has been undertaken.

Both limestone and stream gravel aggregate may represent recoverable resources although the quality and extent of these materials have not been evaluated and no interest in exploration for these resources has been shown to date. Potential for geothermal resources exists at First Box Canyon on the Piedra River along the WSA boundary, although no interest in study or exploration has been evidenced.

Geological Survey - Bureau of Mines Findings

A U.S. Geological Survey - Bureau of Mines Mineral Study is scheduled for the area during the summer of 1982.

LANDS

Lands Ownership

All lands within the 41,500-acre Piedra WSA are Federal lands administered by the U. S. Department of Agriculture, Forest Service. All surface and mineral rights are owned by the United States.

Special Land Uses

Although there are no improvements under special land use permit, there are several outfitter-guide permits for the area. These fall under the category of recreation-type permits and provide a long-established use on the Piedra WSA. These permits are the source of livelihood for several local residents, and provide a needed service in the area. They are distributed fairly evenly throughout the WSA.

Power Withdrawals

A power withdrawal (Power Site Classification No. 357 - withdrawn October 24, 1944) occurs within the WSA along the length of the Piedra River. It encumbers approximately 2,200 acres. No further action has been taken since the withdrawal, and there is little likelihood of development taking place. The Federal Energy Regulatory Commission is scheduled to review this withdrawal for possible revocation within the next three years.

Proposed Impoundments

A potential hydroelectric site exists in the First Box Canyon of the Piedra River and has the capacity for generating 40,000,000 kilowatt hours annually (USDI-Bureau of Reclamation, O'Neal Park Project-Colorado, Reconnaissance Report, p. 2, 1956). Costs determined at the time of the USDI report indicated a benefit/cost ratio of 0.86/1. No further action has been taken since the reconnaissance report which established the project. A letter from the Federal Energy Regulatory Commission confirms that no plans exist for development of the First Fork hydroelectric site. This document is available for review in the Forest Supervisor's office in Durango.

FACILITIES

There are nine livestock water developments in the Piedra WSA consisting of small spring developments. There are also a total of four miles of barbed wire drift fences for livestock management purposes.

Approximately 55 miles of trails are located within the WSA. The official names and numbers of these are listed below:

Trail Name	Number
Sheep Creek Trail	599
Indian Creek Trail	588
First Fork Trail	538
Sand Creek Trail	593
Piedra Trail	596
Coldwater Trail	597
Baldy Mountain Trail	536
Coldwater Stock Trail	598

Access to the Piedra WSA from the south is provided via the First Fork Road (Forest Road 622) and First Notch Road (Forest Road 620), both of

which come within one-fourth mile of the boundary. Access from the north is provided via Piedra Road (Forest Road 631) and Sand Creek Bench Road (Forest Road 642), both of which come within one-eighth mile of the boundary.

PROTECTION

Air Quality

The Piedra Wilderness Study Area is designated as a Class II air quality area. This classification allows only moderate degradation over base-line concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems in the area. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. In recent years, natural fires have generally been excluded from the area by intensive control and suppression efforts. In 1956, the First Fork fire burned 1,200 acres and in 1943, the Coffee Creek fire burned 135 acres, but since then, there have been no major fires. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

SOUTH SAN JUAN WILDERNESS EXPANSION STUDY AREA

VICINITY

The South San Juan Wilderness Expansion Study Area (WSA) is located in Archuleta, Mineral, Conejos, and Rio Grande Counties in southern Colorado, east of the town of Pagosa Springs. The area consists of 32,800 acres of unroaded and undeveloped forest land. Figures VII, VIII and IX show the location of the WSA in relation to the Four Corners (Colorado, Utah, Arizona, and New Mexico), nearby cities, and other Wilderness Areas. Table V lists the acres of existing wildernesses within a 100-mile radius of the WSA.

PHYSICAL SETTING

The WSA is composed of two separate geographic entities, the Montezuma Peak area on the north and the V-Rock Trail area on the south. These are separated from one another by the 130,000 acre South San Juan Wilderness Area. These two areas are similar with respect to physical, biological, social and economic aspects, and for the most part, the following discussion applies equally to both areas. Where distinctions exist, these are discussed.

VEGETATION

Vegetation on the area varies with elevation which ranges from 8,200 feet to over 13,000 feet. Coniferous vegetation occurs over 30 percent

Figure VII Location Map Of The South San Juan Wilderness Expansion Study Area

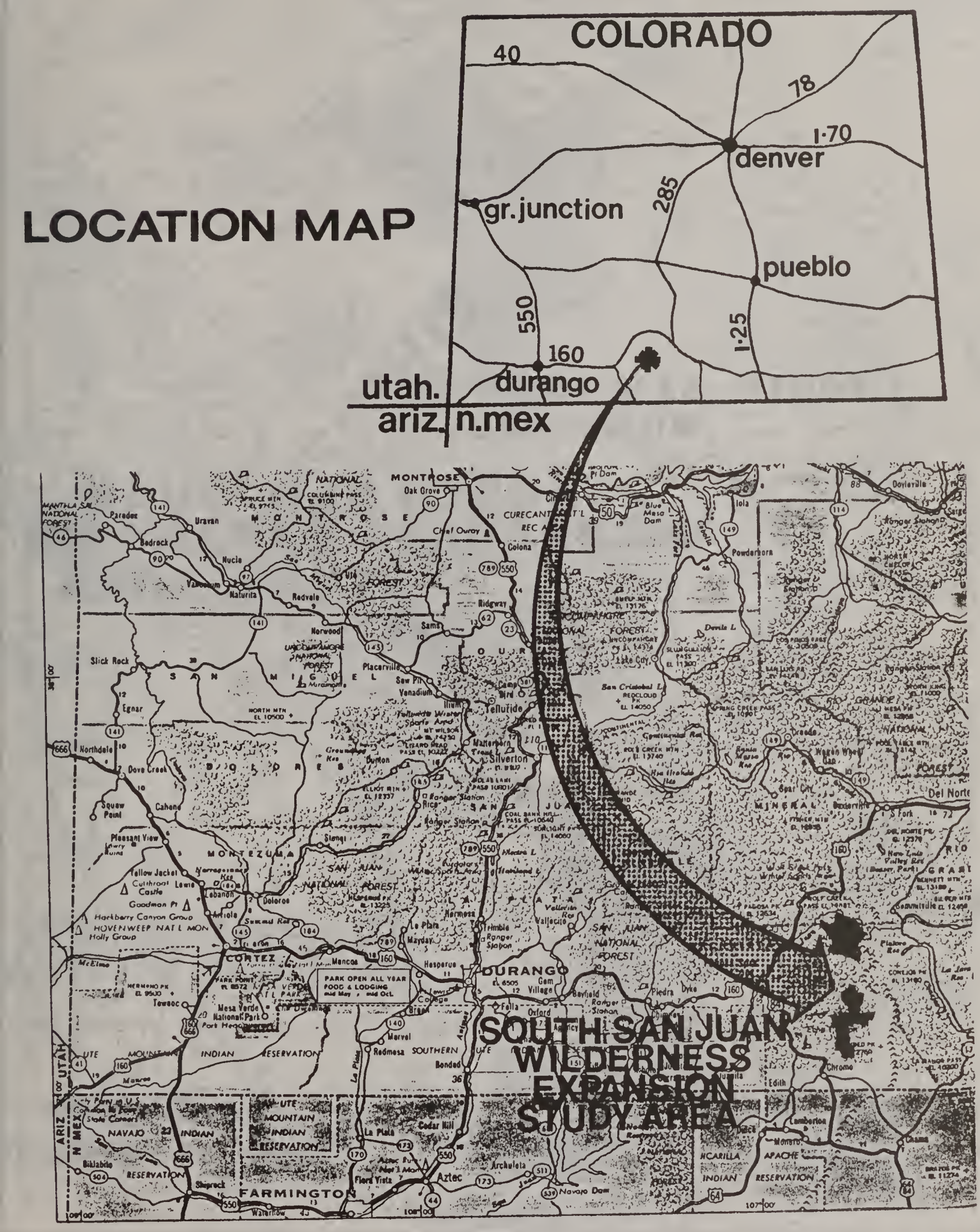


Figure VIII Detail Map Of The South San Juan Wilderness Expansion Study Area

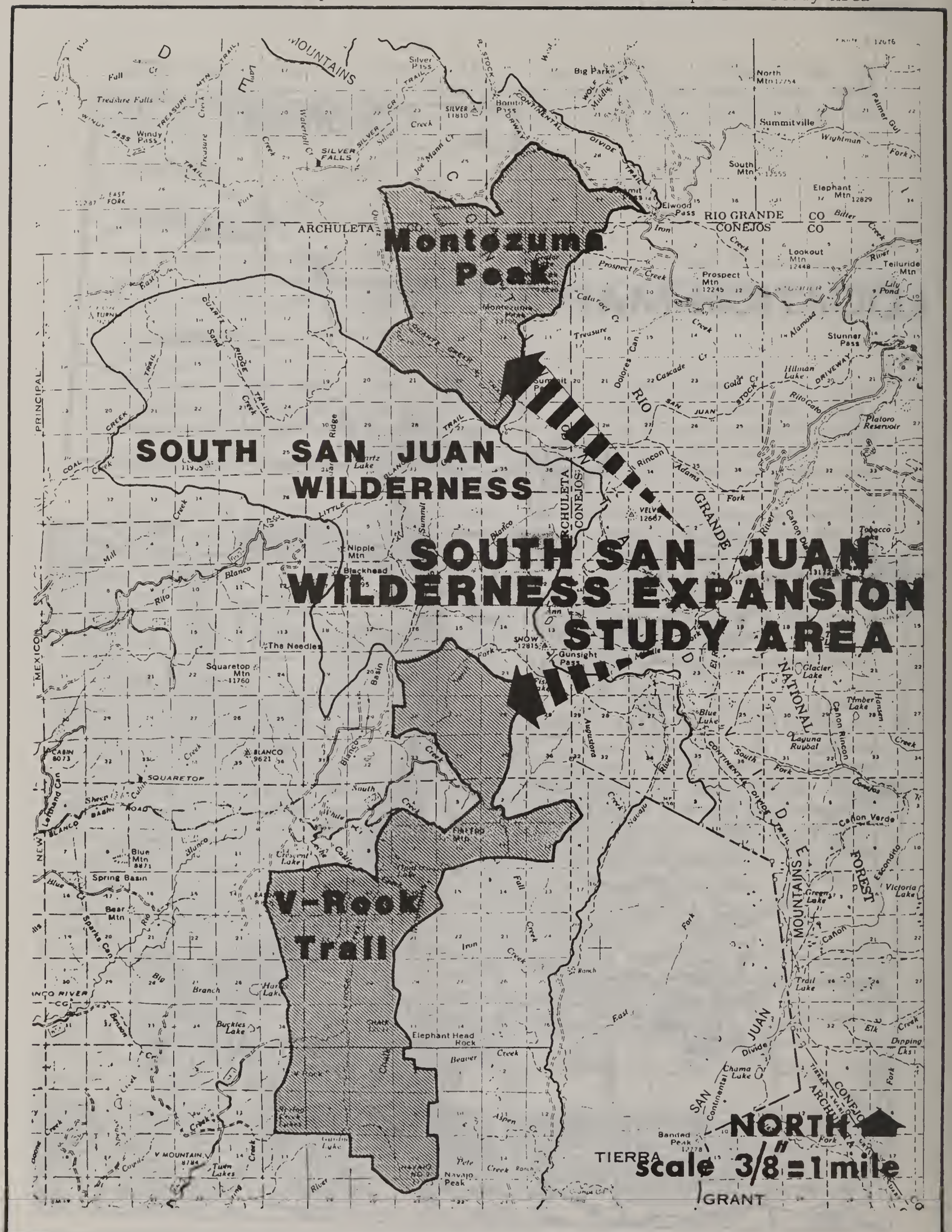


Figure IX South San Juan Wilderness Expansion Study Area and Nearby Wildernesses



TABLE V

Wildernesses Within a 100-Mile Radius of South San Juan Wilderness Expansion Study Area, Showing Size, Total Recreation Visitor Days, and Relative Use Ratings

Wilderness Area	Acres	1980 Use	Recreation Visitor Days Acre/Year	Relative Use Rating
Bandelier (NPS)	23,267	NA	NA	Low*
Big Blue	97,700	NA	NA	Low*
Black Canyon of the Gunnison (NPS)	11,180	NA	NA	Low*
Chama River Canyon	50,260	5,600	.11	Low
Collegiate	159,900	153,200	.96	High
Cruces Basin	18,000	1,600	.09	Low
Dome	5,200	NA	NA	Low*
Great Sand Dunes (NPS)	33,450	NA	NA	Low*
La Garita	108,486	32,300	.30	Low
Latir Peak	20,000	1,500	.08	Low
Lizard Head	40,000	21,000	.53	Moderate
Mesa Verde (NPS)	8,100	NA	NA	Low*
Mt. Sneffels	16,200	11,100	.69	Moderate
Pecos	223,333	198,300	.89	High
San Pedro Parks	41,130	50,200	1.22	High
South San Juan	133,463	41,500	.31	Low
Weminuche	463,224	255,400	.55	Moderate
West Elk	194,412	101,500	.52	Moderate
Wheeler Peak	19,663	9,500	.48	Moderate
Total	1,666,968			

NPS - Administered by the National Park Service, U.S. Department of the Interior
NA - Data not available
* - Estimated relative use rating.

Relative Use Ratings Based on:

0-.35 Recreation Visitor Days/Acre/Year	Low
.36-.70 Recreation Visitor Days/Acre/Year	Moderate
.70+ Recreation Visitor Days/Acre/Year	High

of the area, with Engelmann spruce being the most predominant species. Aspen is prevalent below timberline, covering approximately 17 percent of the area. Another 10 percent of the area is grassland, with the remainder being mostly rocky or barren areas, interspersed with patches

of brush or bogs. Thurber fescue is the most abundant vegetation in non-timbered areas below 10,500 feet elevation. Forbs and grasses comprise the understory in timbered areas, whereas above timberline, alpine grasses, forbs, and willows prevail. Table VI lists the frequency of occurrence of various ecosystem types on the WSA in comparison with other wildernesses. The table indicates that the area is not unique with respect to vegetative composition, with the possible exception that the aspen type is more prevalent.

There are no known threatened or endangered plants on the area.

LANDFORM

The WSA is situated within the San Juan volcanic section of the Southern Rocky Mountains. In the Montezuma Peak area, landform is characterized by highly dissected drainages with steep canyon side slopes. The Continental Divide borders the area along the east, and drainages flow predominantly north to northwest. Much of the area is typical of alpine ecosystems. The V-Rock Trail area is bordered on the east by the Chalk Mountains, which form a hydrographic divide between the Rio Blanco drainage on the west and the Navajo River drainage on the east. Drainages flow north and south, and steep canyons are common.

GEOLOGY

The WSA is situated at the southern-most edge of the San Juan Mountains, which are the result of extensive volcanic activity covering thousands of square miles in the region. Extensive folding and faulting are responsible for the entrapment and retention of oil and gas in the vicinity of the WSA. More recently, surface characteristics have been modified by both piedmont and alpine glaciation. After the glaciers melted, oversteepened valley walls were subject to landsliding that broadened many of the valleys in the area. Rock outcrops and talus slopes are common throughout the area.

SOILS

Soil characteristics and potentials vary considerably as a function of landform, slope, and parent material.

Soils within the WSA have been mapped at a relatively high level of intensity as part of the National Cooperative Soil Survey project. Results of this survey appear in the Soil Survey of the Piedra Area (Bauer, R.F., USDA Soil Conservation Service and Forest Service, April 1981). The report identifies three major soil series within this area. A brief description of each of these follows:

-The Leal Series - These soils occur on the steep mountain slopes and glacial troughs within the area. They are deep, coarse textured soils developing from materials weathered from andesite and quartz latite. Depth to bedrock varies from 40 to 60 inches. These soils are productive for timber, and there are no serious limitations on slopes less than 30 percent. On slopes above 30 percent, there is a high erosion hazard, and on slopes above 65 percent there is a very high erosion hazard along with a high hazard for mass slope failure.

TABLE VI

Representative Ecosystems in the South San Juan Wilderness Expansion Study Area and Nearby Wildernesses

Ecosystem	South San Juan Wilderness Expansion Study Area	Weminuche	South San Juan	Lizard Head	La Garita
ALPINE	Common	Common	Common	Common	Extensive
SUBALPINE	Common	Common	Common	Common	Common
SPRUCE-FIR	Common	Common	Common	Uncommon	Common
DOUGLAS-FIR	Uncommon	Uncommon	Uncommon	Uncommon	Uncommon
ASPEN	Common	Uncommon	Uncommon	Uncommon	Uncommon
PONDEROSA PINE	Uncommon	Uncommon	None	None	None
LODGEPOLE PINE	None	None	None	None	Uncommon

KEY

Extensive - Type occurs on more than 50 percent of the area.
Common - Type occurs on 10 to 40 percent of the area.
Uncommon - Type occurs on less than 10 percent of the area.
None - Type does not occur in area.

-The Grenadier Series - These soils are associated with the Leal soils and occur on similar landforms and slopes. They differ from the Leal soils in that they contain more rocks and stone and are only moderately deep. Depth to bedrock varies from 30 to 40 inches. These soils are also productive for timber. There are no serious limitations that would limit management activities.

-The Castelleia Series - These soils occur mainly in the northwest portion of the V-Rock trail area around the vicinity of Opal Lake and Leche Creek. They are medium textured deep soils developing in old landslide materials that overlay shale and sandstone at depths of 5 to 50 feet. These are relatively productive soils for range and timber. There are no special limitations on slopes less than 25 percent. There is a moderate to high hazard of cut slope failure and mass wasting.

The above soils occur in relatively equal amounts throughout the Wilderness Study Area. Included with these soils are rock outcrops of igneous materials and talus slopes. These may make up 15 to 20 percent of the area. These areas are typically near vertical and support little or no vegetation.

SOCIAL AND ECONOMIC SETTING

The South San Juan Wilderness Expansion Study Area is within the Pagosa Human Resource Unit (HRU), one of the three areas of analysis within the area of social and economic influence of the San Juan National Forest. This area, along with the Animas and Montelores HRU's, was delineated to assist in designing management actions that would be responsive to local issues, conditions, and needs. The Pagosa HRU contains portions of Hinsdale and Mineral Counties, and virtually all of Archuleta County.

POPULATION, EMPLOYMENT AND INCOME

The population of Archuleta County grew by 33 percent between 1970 and 1980, from 2,733 to 3,631. State projections call for the population to double by the year 2010. Employment in the area is primarily in ranching, logging, retail trade and tourism sectors; therefore, much of this employment is seasonal. Unemployment, a chronic problem, was nearly 12 percent in 1980. The average per-capita income in Archuleta County in 1980 was $5,222.

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Public awareness of the recreational environment of the National Forest is increasing with immigration to the area. There is a changing public attitude toward protecting and preserving rather than developing and using resources such as timber, forage and minerals. In the future, direct conflicts can be anticipated between those who hold "preservation attitudes" and these who believe resources should be developed to meet local income and employment needs.

SOCIAL ORGANIZATION

While most of the community services found in other areas are available in the Pagosa HRU, rapidly rising populations are placing strains on school systems, medical facilities, street and road maintenance, and law enforcement capabilities.

POPULATION AND LAND USE

Until a few years ago, Hispanics constituted a majority of the population of Archuleta County. Recent population growth has changed this mix, but the Hispanic influence is still extremely strong. Population growth has created a significant shift in land uses, with the conversion of ranchland into housing subdivisions and resorts.

RESOURCE AND SUPPORT ELEMENTS

RECREATION

Developed recreation is non-existent within the WSA. There are no recreation structures and no developments other than trails. Recreation use is light. Current use, which is approximately 5,200 recreation visitor days (RVD's) annually over the 32,800 acre area (0.152 RVD's per acre per year), is low compared to other nearby wilderness and dispersed recreation areas in the San Juan National Forest. There are approximately 35 miles of trail within the WSA.

Recreation activities include big game hunting, hiking, horseback riding (with associated camping), viewing scenery, nature study, and cross-country skiing. Other activities occurring in limited amounts include fishing and motorcycle riding on trails. This latter activity is limited by rugged terrain and lack of suitable trails.

The South San Juan Wilderness Expansion Study Area offers approximately 6,300 acres of primitive recreation opportunities and approximately 26,500 acres of the semi-primitive non-motorized opportunities. Use is currently 32 percent of capacity.

Visual Resource

The landscape of the WSA is dominated by geologic formations including mountain peaks, talus slopes, cliffs, and deep canyons. Vegetation is highly varied with deciduous trees and brush contrasting with coniferous forest especially during the fall months. It is further diversified by

natural openings and distinctive contrasts with bare rock. Alpine lakes, scattered ponds, and cascading streams comprise the water features of the WSA. Thirty to forty percent of the WSA can be characterized as having distinctive or outstanding scenic quality. The remainder is common to the characteristic landscape of the area.

Cultural Resource

There have been no extensive cultural resource surveys undertaken in the WSA, although various aboriginal camps have reportedly been discovered in the Quartz Creek area. This indicates a likelihood that other camps, activity areas, and associated evidence may exist within the WSA, although it is unlikely that such are numerous or extensive. The WSA is evaluated as being low to moderate in archaeologic sensitivity.

A travel corridor along the east fork of the San Juan River from Elwood Pass to the vicinity of the Silver Falls Guard Station is an important historic area existing in and adjacent to the WSA. This corridor forms the northern boundary of the Montezuma Peak portion of the WSA. It was the route of the first road and telephone line from the San Luis Valley to Pagosa Springs and was used from 1879 until 1911 when it was abandoned as a major travel route. There are some cabin ruins located in the corridor associated with a small, short-lived mining camp at Elwood. Some features associated with early seasonal livestock grazing and mining, such as aspen art and inscriptions, stock driveways, camps, and mining shafts are present. The WSA is evaluated as being of low historic sensitivity, with the exception of Elwood Creek on the east fork of the San Juan River, which is of high sensitivity.

The WSA is situated in the historic territory of the Ute Indians, although archival research and contacts with members of the Southern Ute and Ute Mountain Ute Tribes have failed to identify any specific sites important to the Ute peoples.

WILDERNESS

The WSA is primarily natural in character. There are no known "imprints of man" that would require rehabilitation under the suitable alternative. Certain areas have been used for grazing of livestock, but this is not evident to the casual observer.

Opportunities for primitive and unconfined recreation are plentiful. The WSA has a varied topography, with areas of high vegetative diversity, abundant wildlife, open parks, and portions of dense forest. These are attractive to backpackers, rock climbers, fishermen, hunters, horseback riders and hikers. Outstanding opportunities for solitude exist.

FISH AND WILDLIFE

Big Game

Big game species inhabiting the WSA include elk, mule deer, black bear, turkey, and possibly mountain lion. The area may contain winter den

sites for black bear. Rocky Mountain bighorn sheep utilize portions of this WSA during summer months. Presently, winter range for bighorns within the WSA appears to be limited.

Small Game

Small game species include band-tailed pigeon, snowshoe hare, cottontail rabbit, blue grouse, white-tailed ptarmigan, and Abert's squirrel. Utilization is generally year round except for the band-tailed pigeon which is a summer resident.

Non-game

Species commonly found in the mixed conifer and spruce-fir zones of Colorado are found in this WSA. Commonly observed species include coyote, ground squirrel, marmot, pika, raven, Canada jay, mountain bluebird, and water ouzel. The more mobile species utilize the WSA primarily during spring, summer and fall. Most of the smaller rodents and some birds utilize the WSA year round.

Threatened and Endangered (T&E) Species

Although there are no known federally listed T&E species inhabiting the unit, most of this WSA is within the boundaries of a cooperative study between the Colorado Division of Wildlife, U.S. Forest Service, and U.S. Fish and Wildlife Service to determine the presence or absence of grizzly bear and to determine the extent of and suitability of the WSA for grizzly bear habitat. This study was prompted by the killing of a sow grizzly in 1979 at the head of the Navajo River. First year study results have not yet been reported, although preliminary results confirm that there is acceptable habitat for grizzly bear in the unit. There is acceptable habitat for wolverine but no known confirmed recent sightings. The wolverine is on the Colorado list of threatened species.

Fish

Fish species in the area include cutthroat, rainbow, and brook trout. Some waters contain spawning habitat with some natural reproduction, although supplemental stocking by the Colorado Division of Wildlife is required on a periodic basis to maintain fishable populations under present harvest regulations.

RANGE

Cattle and recreation horses graze about 30 percent of the WSA. Most of the range is in satisfactory condition and the trend is for conditions to remain stable. Current grazing totals about 1,500 Animal Unit Months annually. There are relatively few range improvements in the area, and these are limited to allotment boundary fences, short drift fences, and spring developments.

In the Montezuma Peak area, grazing takes place on portions of two allotments, one of which is a sheep allotment being extensively managed, and one of which is a cattle allotment being intensively managed under a

deferred rotation system. In the V-Rock Trail area, grazing is taking place on portions of seven allotments, one of which is a vacant sheep allotment. The other six are cattle allotments, one of which is being intensively managed under a deferred-rotation system. The remaining five are being extensively managed under a continuous grazing system.

TIMBER

Of the 32,800 acres within the WSA, 22,131 acres (67 percent) are classified as "capable" of timber production. Capable forest land is land that has the biological potential to produce at least 20 cubic feet of wood per acre per year. Productivity is average for the Forest, and there has been no past timber harvesting activity. Ninety-five percent of this capable timber land is sawtimber. The predominant timber type is spruce-fir, which covers 69 percent of the capable forest land. The distribution by timber type and size class is shown below.

Acres Capable of Timber Production by Type and Stand Size Class

Type	Stand Size Class				
	Non-stocked (0-300 trees/ acre)	Seedling/ sapling	Pole timber	Saw-timber	Total
Ponderosa pine	-	-	-	-	0
Spruce-fir	197	-	905	14,180	15,282
Douglas-fir	-	-	-	1,852	1,852
Aspen	-	-	-	4,997	4,997
Total	197	0	905	21,029	22,131

The inventory of existing timber on capable forest land within the WSA is 63.9 million cubic feet or 260.5 million board feet. Most of the inventory volume is in the spruce-fir type. The distribution of inventory volume by timber type is shown below:

Inventory Volume by Timber Type

Timber Type	Million Cubic Feet	Million Board Feet
Ponderosa pine	-0-	-0-
Spruce-fir	56.6	234.4
Douglas-fir	3.9	16.6
Aspen	3.4	9.5
Total	63.9	260.5

Capable forest land occurs in roughly equal amounts on each slope class. However, in the Montezuma Peak unit, 65 percent occurs on slopes greater than 60 percent and in the V-Rock Trail unit, 54 percent occurs on slopes less than 30 percent. This breakdown is shown below.

Capable Forest Land Acres By Type And Slope Class

Timber Type	Slope Class 0-30%	30-60%	60% +	Total
Ponderosa pine	-	-	-	0
Spruce-fir	3,774	6,174	5,334	15,282
Douglas-fir	683	1,136	33	1,852
Aspen	3,937	807	253	4,997
Total	8,394	8,117	5,620	22,131

WATER

Water Yield

Water yield from the WSA is estimated at 49,355 acre-feet per year, for an average of 1.5 acre-feet per acre per year. Water from the Montezuma Peak area flows into the east fork of the San Juan River via Quartz Creek, Lost Creek, Bear Creek, and Elwood Creek. The northern three-fourths of the V-Rock Trail area drains northward into the Rio Blanco River via Fish Creek, South Creek, Castle Creek, and Leche Creek. The southern fourth (below V-Rock Trail) is drained by the little Navajo River. Water uses within the study area include small amounts of domestic livestock and wildlife drinking and recreational and riparian habitat maintenance.

Downstream water uses on the East Fork of the San Juan, Rio Blanco, and Little Navajo Rivers include pasture irrigation, domestic livestock and wildlife drinking, and domestic (residential and campground) uses. Non-consumptive uses include recreation (fishing and scenic viewing) and maintenance of both aquatic and riparian habitat as well as stream channel stability. Anticipated future uses include additional domestic and irrigation use and potential energy development.

Maximum potential water yield increases could result from clearcutting 20 percent of the accessible spruce-fir and aspen stands (for transpiration reduction and snow catchment) and maintaining snowfences in 25 percent of the alpine area. Potential water yield increase could reach 1,450 acre-feet per year (1,125 in V-Rock Trail and 325 in Montezuma Peak) for an increase of 3 percent.

No water resource measurement sites (streamflow, climate, snow depth) occur within the WSA.

Additional potential for water yield increase may occur by cloud seeding with silver iodide crystals. A study by the Bureau of Reclamation (Ecological Impacts of Snowpack Augmentation in the San Juan Mountains of Colorado, Steinhoff and Ives, Bureau of Reclamation, U.S. Department of Interior, Denver, Colorado, 1976) indicates that streamflow increases of 10 percent are possible although snowfall variability in the San Juan makes it difficult to statistically verify water yield increases through this method.

Water Quality

The only water quality data for the WSA is from monitoring near mineral exploration activities by AMAX Exploration, Inc. on Quartz Creek and one of its tributaries. Indications are that water chemistry is highly influenced by the extrusive igneous parent material of the Quartz Creek area. Sediment discharge is low in streams flowing through volcanic formations but increases as streams flow into sedimentary formations (sandstones and shales) at the lower end of the WSA. Except for local acid water conditions, which are diluted out, streams meet Colorado water quality standards for recreation, aquatic life, and municipal and agricultural uses.

MINERALS

Mining and Mineral Leasing Activity

Mining and mineral leasing activity in the WSA is summarized below:

Activity (As of April 30, 1982)	Number	Acres
Patented Mining Claims	2	30
Unpatented Mining Claims	165	3,399
Producing Sites or Known Reserves	0	0
Federal Oil & Gas Lease Applications	3	2,940
Federal Oil & Gas Leases	7	3,320

There has been active exploratory core drilling by two companies on claim blocks within the Montezuma Peak portion of the WSA. This activity may continue through 1982 by at least two separate interests. There is seismic exploration activity adjacent to the boundary of the V-Rock Trail portion of the WSA as well as oil and gas production in nearby fields.

Mineral Potential

Potential for locatable and leasable minerals in the WSA is summarized below:

Area Rated As Having High/Moderate Potential For:	Acres	Percent of Study Area	
Locatable minerals	12,081	36.9	(All of which is in Montezuma Peak Area.)
Leasable minerals	15,632	47.7	(All of which is in V-Rock Trail Area.)

The Montezuma Peak portion of the WSA contains hydrothermally altered rock and a few potentially economic veins containing zinc, silver, and lead. The hydrothermally altered area and an associated aeromagnetic anomaly suggests a large buried porphyry deposit of molybdenum or copper. Evidence also suggests the occurrence of a large porphyry-type sulfide deposit buried 5,000 feet or more below the surface. Associated with this is a chimney-type deposit containing copper above the porphyry-type deposit at an estimated depth of a few hundred feet. There are indications that the area also contains zinc, silver, and lead.

In the V-Rock Trail portion of the WSA, the potential for locatable minerals is low. However, potential for leasable minerals is moderate to high. Significant quantities of oil and gas may be trapped in buried structures. Two known oil fields are within 4 miles of the southern boundary of the WSA. Geologic factors that suggest significant oil potentials are: (1) proximity of source beds capable of generating oil and gas, (2) abundance of porous sands which permit migration and storage, and (3) presence of favorable structural traps similar to those in nearby fields.

The entire WSA is considered to have low or no potential for geothermal resources, uranium, coal or natural gas.

The study report that supports the above information on both portions of the South San Juan Wilderness Expansion Study Area is the Survey Report of the United States Geological Survey Open-File Report 77-309, 1977, Mineral Resources of the Chama-Southern San Juan Mountains Wilderness Study Area, Mineral, Rio Grande, Archuleta, and Conejos Counties, Colorado.

LANDS

Lands Ownership

Total land area within the South San Juan Wilderness Expansion Study Area is approximately 32,800 acres of which 13,000 acres are in the Montezuma Peak portion and 19,800 acres are in the V-Rock Trail portion. There are two patented mining claims covering 30 acres within the Montezuma Peak portion, on which the Forest Service controls surface rights. These have been identified by the Forest Service as land desirable for acquisition. Throughout the remainder of the WSA, lands are federally owned in both surface and mineral estate and are administered by the Forest Service.

Special Land Uses

Presently there are no improvements authorized by Special Use Permit in the WSA.

Power Withdrawals

There are no power withdrawals within the WSA.

Water Developments

No existing or proposed impoundments, irrigation reservoirs, or distribution systems are located within the WSA. According to Colorado Water Resource Division records, no decreed water rights exist.

FACILITIES

There are three livestock water developments within the WSA. These are relatively small spring developments. There are also approximately 10

miles of allotment boundary and short drift fences that exist for livestock management purposes. There are no additional facilities other than approximately 35 miles of trails, which are maintained by the Forest Service and which are used primarily for recreation and livestock management. The Quartz Creek Trail (No. 571) borders the western edge of the Montezuma Peak area, then traverses through the WSA to its junction with the Continental Divide Trail (No. 813). The Continental Divide Trail itself borders the eastern edge of the Montezuma Peak area. Several trails traverse into and through the V-Rock Trail portion. These are Fish Creek Trail (No. 575), Leche Creek Trail (No. 576), Navajo Peak Trail (No. 577), and V-Rock Trail (No. 578). Road access to the V-Rock Trail portion is provided via the Buckles Lake Road (No. 663) and the Castle Creek Road (No. 770).

PROTECTION

Air Quality

The WSA is designated a Class II air quality area. This classification allows only moderate degradation over baseline concentrations of sulfur oxides and particulate matter.

Fire

Fire has always been a natural component of the ecosystems in the area. A naturally occurring fire regime has the effect of reducing fuels, maintaining wildlife habitat diversity, creating browse, and preventing the attainment of climax vegetation across large areas of land. Although wildfire occurrence is generally low, in recent years natural fires have generally been excluded from the area by intensive control and suppression efforts. Most fires result from lightning strikes and are controlled at less than 10 acres in size.

☆U.S. GOVERNMENT PRINTING OFFICE:1982—578-996 / 502

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San Juan National Forest Colorado

Alternative A

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

Alternative A

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04



"Management area groupings are multiple use management prescription combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative."

A — Grouping A -- Provides a high level of livestock production in a sustained yield basis. Forage production and composition, and watershed conditions are improved. Forested land is not suitable for timber production, but wood products are available if harvest is compatible with livestock production. Wildlife habitat is not emphasized.

B — Grouping B -- Provides high levels of livestock production, increased water yield and improved wildlife habitat. Timber is produced at high levels. Moderate wildlife habitat diversity is maintained.

C — [illegible]

D — Grouping D -- Provides increased production and use of wood fiber, improved wildlife habitat and dispersed recreation opportunities, and maintains a mix of other resource values. Tree and other vegetative cover is extensively modified. High investments are made in timber management, and in other resources when it promotes high wood fiber production.

E — Grouping E -- Provides and maintains high quality habitat for wildlife. Wildlife numbers are increased, watershed conditions are improved, and a high degree of vegetative diversity is provided. Existing vegetative cover is extensively modified through tree and other vegetation management. Timber and livestock production are below optimum levels, recreation is managed to provide dispersed activities in a wooded setting.

F — Grouping F -- Provides a high level of wildlife habitat while maintaining other resources at moderate levels. Increased wildlife numbers and watershed improvements are emphasized. Livestock use is moderate. Wood products are produced at high levels on commercial forest land, vegetation diversity goals are emphasized.

G — Grouping G -- Provides semi-primitive motorized recreation opportunities. Other resource uses occur if they are compatible with or enhance the recreation experience. Livestock grazing is a compatible use, but secondary to dispersed recreation. Forested land is suitable for timber production in G_1, it is not in G_2.

H — Grouping H -- Provides high quality semi-primitive non-motorized recreation opportunities in a natural environment. Other resource uses occur if they are compatible with or enhance this type of recreation experience. Forested land is not suitable for timber production; however, wood products are available if harvest is compatible with semi-primitive dispersed recreation.

I — Grouping I -- Provides for the maintenance, development and expansion of downhill ski area sites by the private sector. In areas presently undeveloped management for other resource uses is limited so that opportunity for ski area development is not lost. Provides high level road-oriented recreation opportunities along sensitive travel routes. High investments are made in management of resources to enhance recreation opportunities and scenic qualities. Forested land is not suitable for timber production.

J — Grouping J -- Provides a range of high-level road-oriented recreation opportunities along sensitive travel routes while enhancing or maintaining scenic qualities inherent in a forest environment. Decreases wood fiber outputs, high investments are made in road construction, facilities, and activities that enhance recreation and the scenic qualities of the landscape. Forested land is suitable for timber production.

K — Grouping K -- Protects and preserves the physical and biological character of designated Wilderness and Wilderness Study Areas until Congressional action. Forested land is not suitable for timber production.

L — Grouping L -- Protects and preserves the prehistoric, [illegible] falcon habitat found within the Chimney Rock Archaeological Area. [illegible] public use is limited, [illegible] allows increased recreational use. Other public land management activities and resource uses are [illegible] constrained. Forested land is not suitable for timber production.

M — Grouping M -- Protects or enhances aquatic and riparian ecosystems and [illegible] for floodplain management. Improvements in water [illegible] and wildlife habitat, visual quality, and public safety and health are emphasized. These areas are not designated on the map, but occur throughout all other management area groupings. Forested land is not suitable for timber production.

N — Grouping N -- Protects and maintains river corridors which have been determined eligible for inclusion in the National Wild and Scenic Rivers System. Forested land is not suitable for timber production.

O — Grouping O -- Manages Research Natural Areas to preserve naturally occurring ecosystems for research and educational purposes. Forested land is not suitable for timber production.

P — Grouping P -- Provides high water yield on suitable lands through intensive management practices. Timber cutting is modified to increase runoff. P_F accomplishes this through commercial timber sales and forested lands are suitable for timber production. P_D accomplishes this through non-commercial vegetation manipulation and forested lands are not suitable for timber production. Wildlife habitat is not emphasized, although habitat for some species is improved. Other resource uses continue at moderate levels. [illegible]

Q — Grouping Q -- Provides opportunities for developed recreation, including existing and proposed campgrounds and picnic grounds. Existing sites are managed for the safety and convenience of the Forest user. Proposed sites are managed to maintain the site attractiveness until developed. Facilities at existing sites to be closed are removed. Sites within this grouping are mapped with recreation symbols (See Legend). Forested lands are not suitable for timber production.

R — Grouping R -- Provides utilization of available livestock forage for low density dispersed recreation opportunities and for maintenance of wildlife habitat. Emphasis is on providing a mix of resource outputs with very low investments. Forested lands are not suitable for timber production.

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wilderness and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_1, 8_2, 8_3, and 8_4 rely on indirect means of protecting wilderness values while 8_5, 8_6, 8_7 and 8_8 use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

LEGEND

- Only the Picnic Ground in the developed recreation site will be fenced
- Ski Patrol Ranger Station
- Ski Patrol Aid Station
- Downhill ski area
- Ski area will be expanded
- Proposed ski area
- Proposed McPhee Reservoir pool
- Continental Divide National Scenic Trail
- Existing electronic site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- Corridor boundary for proposed city project pipeline and power-transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- Corridor boundary for proposed power-transmission line
- Forest Supervisor's Office
- NAME — Wilderness and Special Area boundary and name

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest Headquarters.

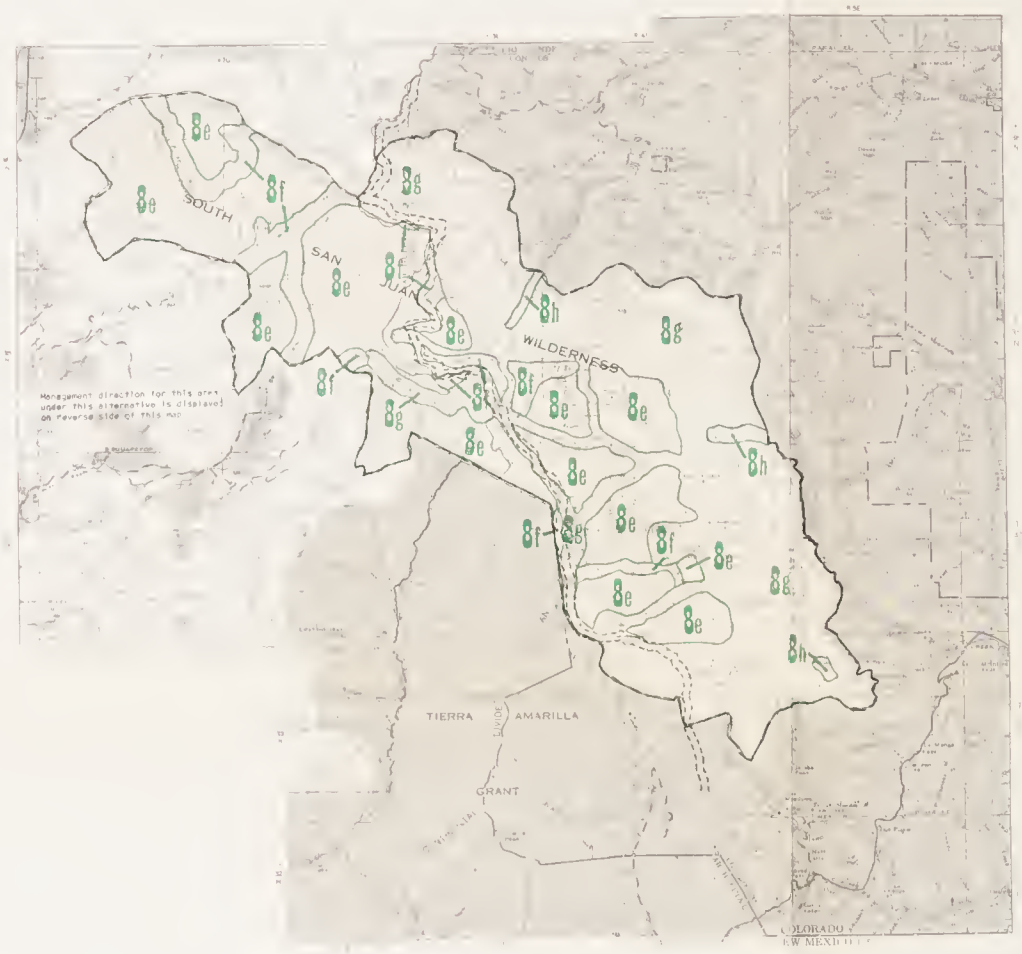
N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisors Headquarters
- District Rangers Station
- Forest Service Station
- House, Cabin or other Building
- Dam
- Well
- Water Well
- Spring
- Mountain Peak
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest

Lands not covered by this plan

Notes:



N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- Interstate Highway and U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trails
- Railroad
- District Ranger Station
- Forest Service Station
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Visitors Center
- House, Cabin or other Building
- Dam
- Well
- Lands not covered by this plan

Scale 1/4" = 1 mile

0 1 2 3 4 5

LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

CDNST — Continental Divide National Scenic Trail

NAME — Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8

Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



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San Juan National Forest Colorado

Alternative B

Land and Resource Management Plan

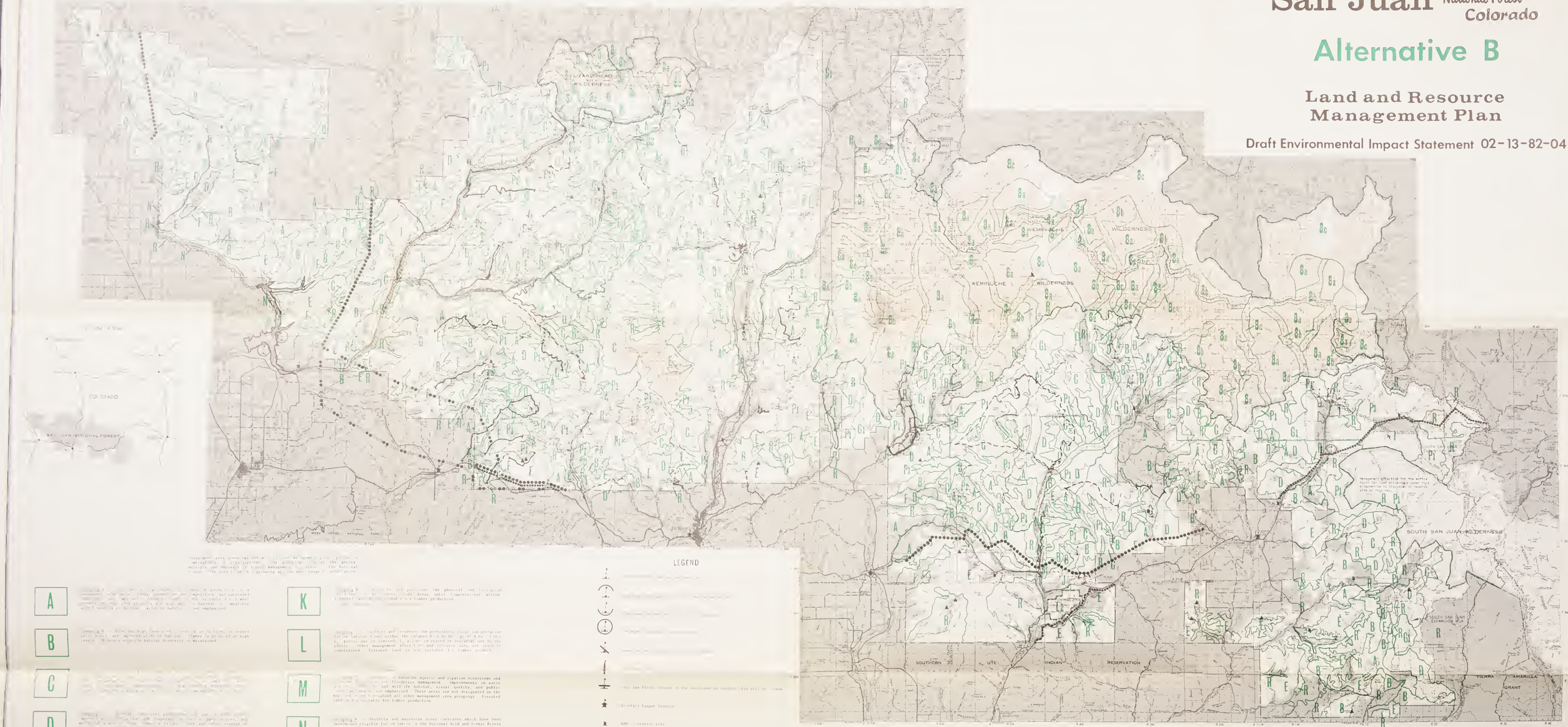
Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

Alternative B

Land and Resource Management Plan

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A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

8

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

LEGEND

- Ranger District Station
- Administrative site
- Existing ski area
- Ski area will be expanded
- Proposed ski area
- Proposed McPhee Reservoir project
- Continental Divide National Scenic Trail
- Existing electronic site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- Corridor boundary for proposed pipeline and power transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- Corridor boundary for proposed power transmission line
- Forest Supervisor's office
- NAME — Wilderness and Special Area boundary and name

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

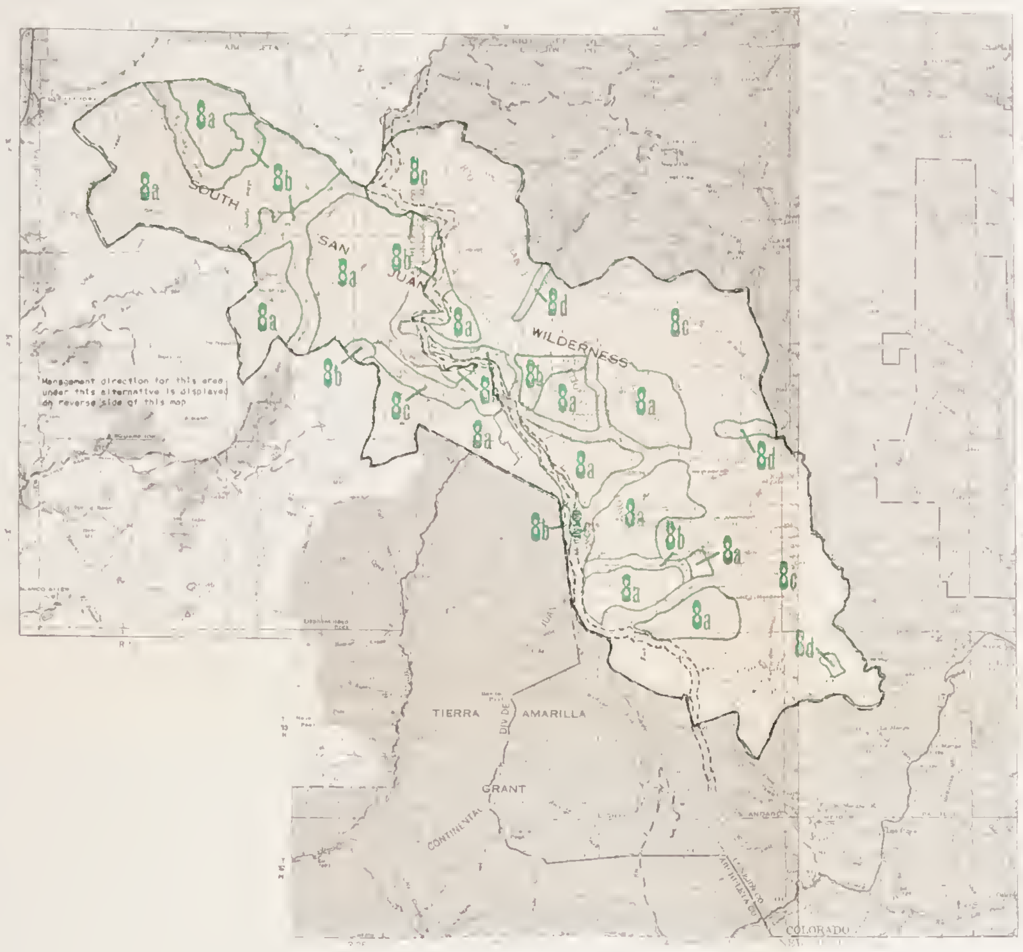
All other areas available for leasing with Surface Occupancy

Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest Headquarters.

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Unimproved Road
- Primitive Road
- 4WD 4 Four Wheel Drive Road
- Trail
- Forest Supervisors Headquarters
- District Ranger Station
- Forest Service Station
- House, Cabin or other Building
- Dam
- Well
- Mine Well
- Spring
- Mountain Pass
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Points of Interest
- Lands not covered by this plan

Notes:



LEGEND

National Forest Boundary
Adjacent National Forest Boundary
County Boundary Line
Reservation Boundary
Wilderness or Primitive Area Boundary
Interstate Highway and U.S. Highway
State Highway
Forest Route
Paved Road
All Weather Road
Dirt Road
Primitive Road
Trails
Railroad

District Ranger Station
Forest Service Station
Mine Quarry or Gravel Pit
Recreation Site
Recreation Site other than Forest Service
Ski Area
Overlook
Point of Interest
Visitors Center
House Cabin or other Building
Dam
Well
Lands not covered by this plan

Scale ½" = 1 mile

0 1 2 3 4 5

LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

CONST Continental Divide National Scenic Trail

NAME Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

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8 Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



San Juan National Forest Colorado

Alternative C

Land and Resource Management Plan

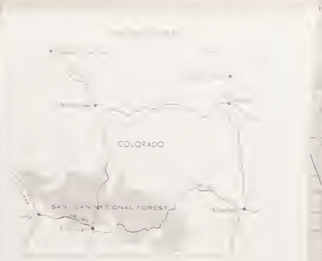
Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

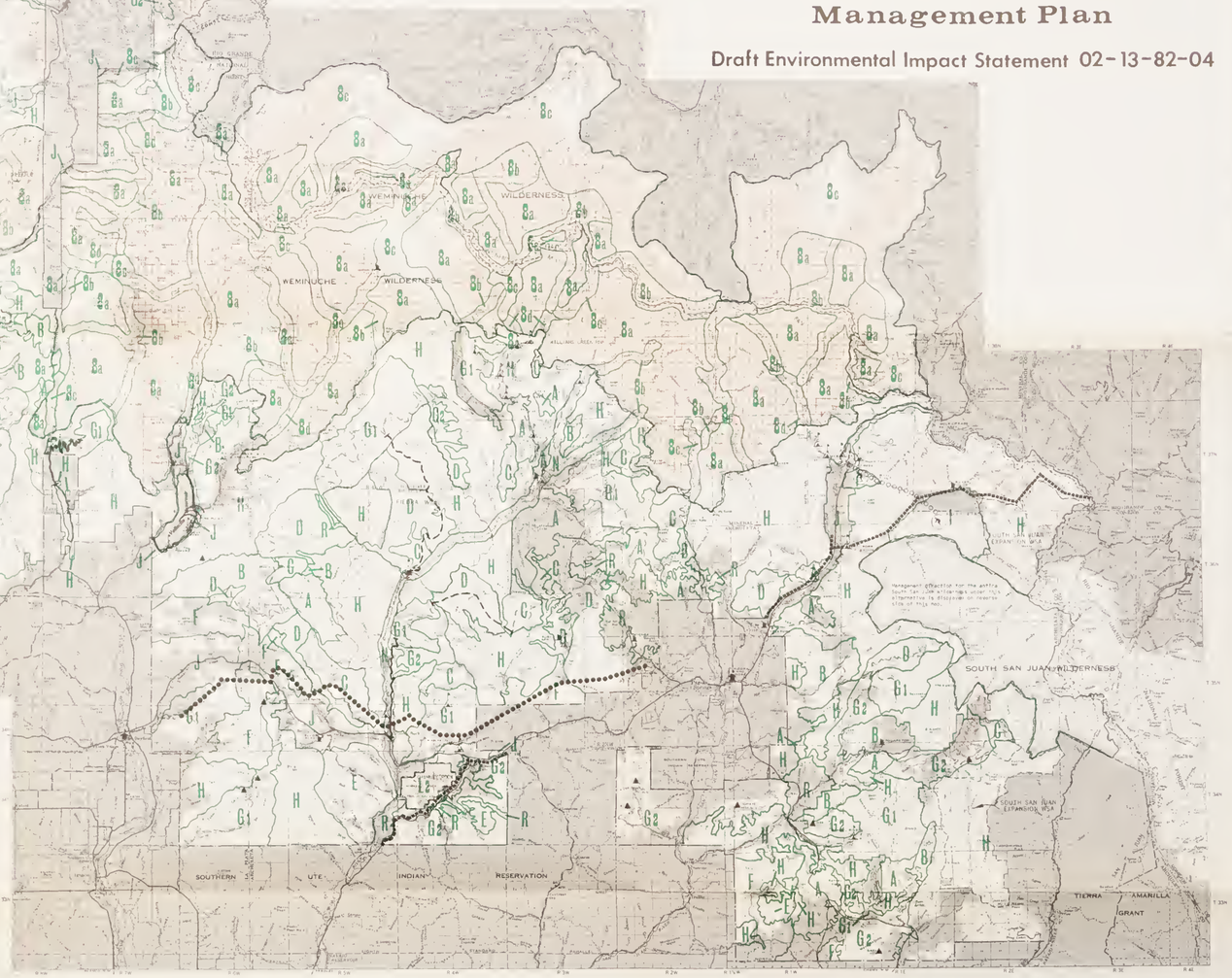
Alternative C

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04







A — Grouping A -- [illegible] management practices [illegible] and watershed [illegible] and [illegible] but timber [illegible] is suitable [illegible] Forest is capable [illegible] to obtain [illegible] management

B — Grouping B -- [illegible] increased [illegible] and [illegible] will be produced at high [illegible] Dominate wildlife habitat diversity is maintained

C — [illegible] Management emphasis [illegible] and [illegible] Forested land is not suitable for timber production

D — [illegible] Manages [illegible] to provide [illegible] and maintains [illegible] Timber [illegible] vegetation [illegible] Forested land is not suitable for timber production

E — Grouping E -- [illegible] Provides habitat for [illegible] Timber [illegible] increased watershed [illegible] are emphasized, and a high degree of [illegible] of [illegible] is provided. Edge [illegible] emphasized. Timber [illegible] modified through time and [illegible] Timber and [illegible] provide [illegible] Forested land is not suitable for timber production

F — Grouping F -- Provides a high level of wildlife habitat [illegible] Habitat [illegible] at moderate levels. Forest [illegible] numbers and variations [illegible] are emphasized. [illegible] use is moderate. Wildlife species are protected at high levels. [illegible] Forest land, vegetative [illegible] are emphasized

G — Grouping G -- [illegible] and [illegible] opportunities [illegible] Timber [illegible] are [illegible] with [illegible] Forested land is suitable for timber production

H — Grouping H -- Provides high quality semi-primitive non-motorized recreation opportunities in a [illegible] environment. Other resource uses [illegible] are compatible with [illegible] Forested land is not suitable for timber production. [illegible] products are [illegible] of harvest is compatible with semi-primitive dispersed recreation

I — Grouping I -- Provides for the maintenance, development and expansion of [illegible] ski area sites by the private sector. In areas generally [illegible] management for other resource uses is [illegible] that opportunities for ski area development are not lost. Provides high level of [illegible] recreation opportunities including sensitive travel routes. [illegible] investments are made in management of resources to enhance recreation opportunities and [illegible] use. Forested land is not suitable for timber production

J — Grouping J -- Provides a range of high level cross-country recreation opportunities [illegible] Motorized use is restricted to designated roads while mountain [illegible] Habitat [illegible] are [illegible] in a [illegible] environment. Decreases [illegible] in [illegible] opportunities [illegible] Big investments are made in road [illegible] of facilities, and visuals so that [illegible] recreation and the [illegible] qualities of the landscape. Forested land is suitable for timber production

K — Grouping K -- [illegible] and preserves the physical and biological [illegible] Timber [illegible] Study Areas until Congressional action [illegible] Forested land is not suitable for timber production

L — Grouping L -- [illegible] protects and preserves the prehistoric, historic and [illegible] in a habitat found within the Dunn's Bottom Special Area. Other [illegible] public use is limited. [illegible] all [illegible] recreational use by the public. Other management activities and resource uses are severely constrained. Forested land is not suitable for timber production

M — Grouping M -- [illegible] Maintains or enhances aquatic and riparian ecosystems and [illegible] directs for [illegible] diversity management. Improvements in water quality, fisheries and wildlife habitat, visual quality, and public safety and health are emphasized. These areas are not designated on the map, however, all other management area groupings. Forested land is not suitable for timber production

N — Grouping N -- Protects and maintains river corridors which have been determined eligible for inclusion in the National Wild and Scenic Rivers System. Forested land is not suitable for timber production

O — Grouping O -- Manages Research Natural Areas to preserve naturally occurring ecosystems for research and educational purposes. Forested land is not suitable for timber production

P — Grouping P -- Provides high water yield on suitable lands through intensive management practices. Timber cutting is modified to increase runoff. P accomplishes this through commercial timber sales and forested lands are suitable for timber production. P accomplishes this through non-commercial vegetation manipulation and forested lands are not suitable for timber production. Wildlife habitat is not emphasized, although habitat for some species is improved. Other resource uses continue at moderate levels

Q — Grouping Q -- Provides opportunities for developed recreation, including existing and proposed campgrounds and picnic grounds. Existing sites are managed for the safety and convenience of the Forest user. Proposed sites are managed to maintain the site attractiveness until developed facilities at existing sites to be closed are removed. Sites within this grouping are mapped with recreation symbols (See Legend). Forested lands are not suitable for timber production

R — Grouping R -- Provides utilization of available livestock forage for low density dispersed recreation opportunities and for maintenance of wildlife habitat. Emphasis is on providing a mix of resource outputs with very low investments. Forested lands are not suitable for timber production

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wilderness and wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_1, 8_2, 8_3, and 8_4 rely on indirect means of protecting wilderness values while 8_5, 8_6, 8_7, and 8_8 use extensive visitor controls. Forested lands are not suitable for timber production

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION CONTAINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

LEGEND

- Only the Picnic Ground in the developed recreation site will be closed
- District Ranger Station
- Administrative site
- Existing ski area
- Ski area will be expanded
- Proposed ski area
- Proposed McPhee Reservoir project
- Continental Divide National Scenic Trail
- Existing ole Ironi site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- Corridor boundary for proposed San Juan project pipeline and power-transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- Corridor boundary for proposed power-transmission line
- Forest Supervisor's Office
- (NAME) Wilderness and Special Area boundary and name

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

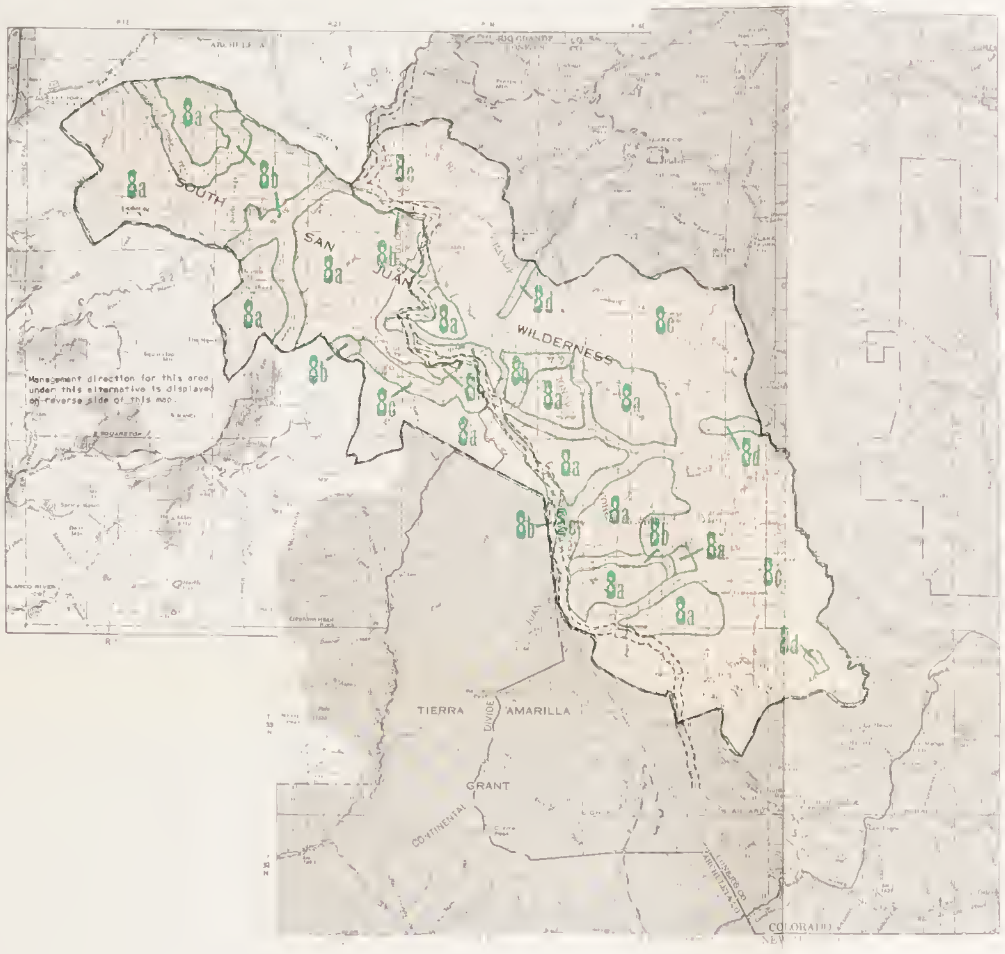
Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest Headquarters.

N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisors Headquarters
- District Ranger Station
- Forest Service Station
- House, Cabin or other Building
- Dam
- well
- Wells Well
- Spring
- Mountain Pass
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Lands not covered by this plan

Notes:



LEGEND

	National Forest Boundary		District Ranger Station
	Adjacent National Forest Boundary		Forest Service Station
	County Boundary Line		Mine, Quarry or Gravel Pit
	Reservation Boundary		Recreation Site
	Wilderness or Primitive Area Boundary		Recreation Site other than Forest Service
	Interstate Highway and U.S. Highway		Ski Area
	State Highway		Overlook
	Forest Route		Point of Interest
	Paved Road		Visitors Center
	All Weather R...		House, Cabin or other Building
	Dirt Road		Dam
	Primitive R...d		Well
	Trails		
	Railroad		Lands not ...vered by this plan

Scale ½" = 1 mile

0 1 2 3 4 5

LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Continental Divide National Scenic Trail

Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8

Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



SOUTH SAN JUAN WILDERNESS

R0000 923185

San Juan National Forest Colorado

Alternative D

Land and Resource Management Plan

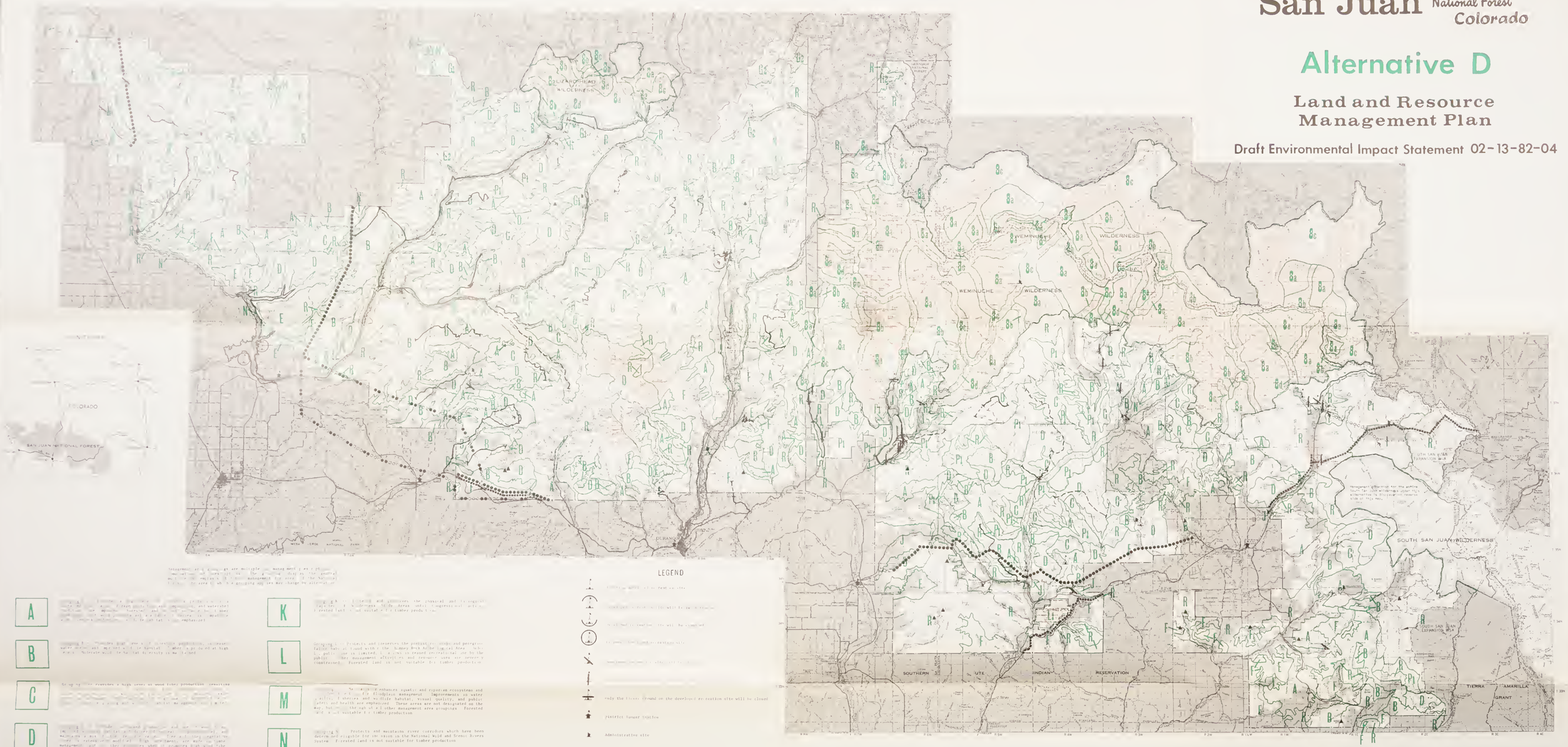
Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

Alternative D

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04



A

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R

S

LEGEND

Only the fenced ground on the developed recreation site will be closed

Pistol or Ranger Station

Administrative site

Existing ski area

Ski area will be expanded

Proposed ski area

Proposed Wilderness survey boundary

Continental Divide National Scenic Trail

Existing electronic site

Existing power-transmission line

Proposed power-transmission line

Existing pipeline

Corridor boundary for proposed coal project pipeline and power transmission line

Road segments planned for reconstruction

Road segments planned for new construction

Corridor boundary for proposed power-transmission line

Forest Supervisor's Office

NAME — Wilderness and Special Area boundary and name

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest headquarters.

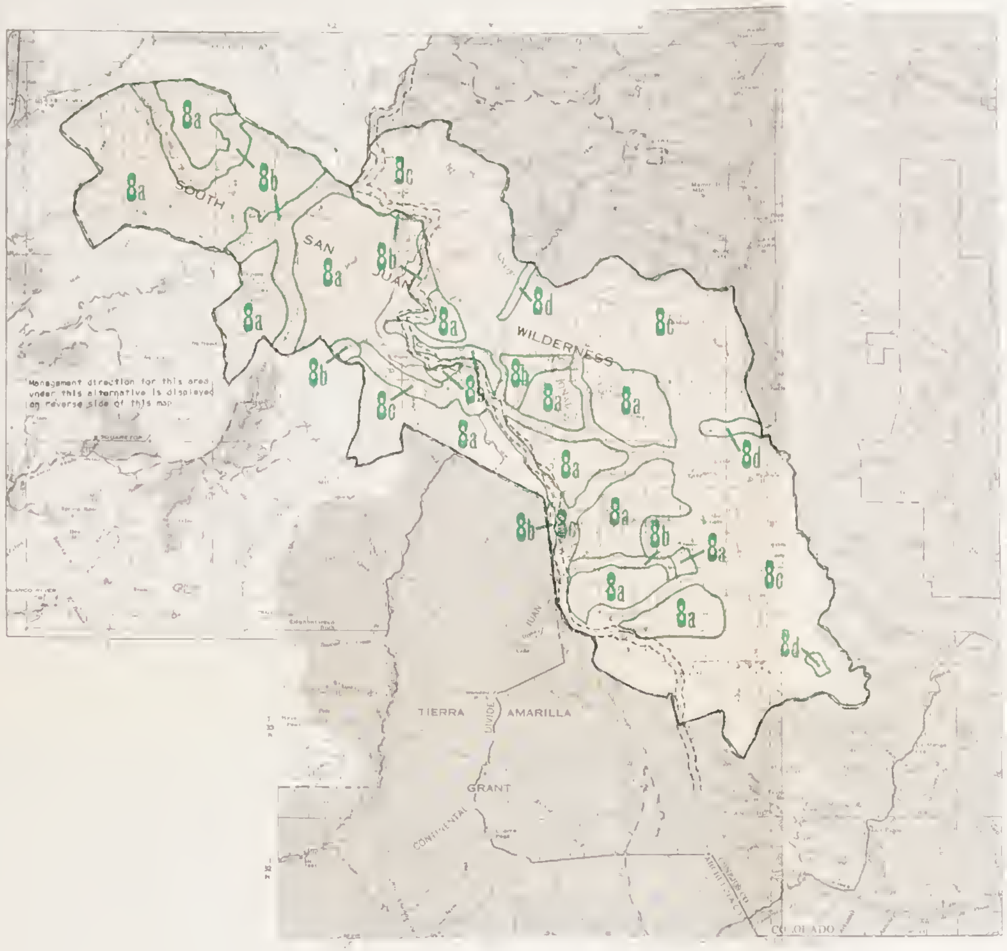
N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisors Headquarters
- District Ranger Station
- Forest Service Station
- House, Cabin or other Building
- Dam
- Well
- Water Well
- Spring
- Mountain Peak
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site (other than Forest Service)
- Ski Area
- Overlook
- Point of Interest

Lands not covered by this plan

Notes:





LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

CONST — Continental Divide National Scenic Trail

NAME — Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

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Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



SOUTH SAN JUAN WILDERNESS

R0000 923185

San Juan National Forest Colorado

Alternative E
RPA

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04

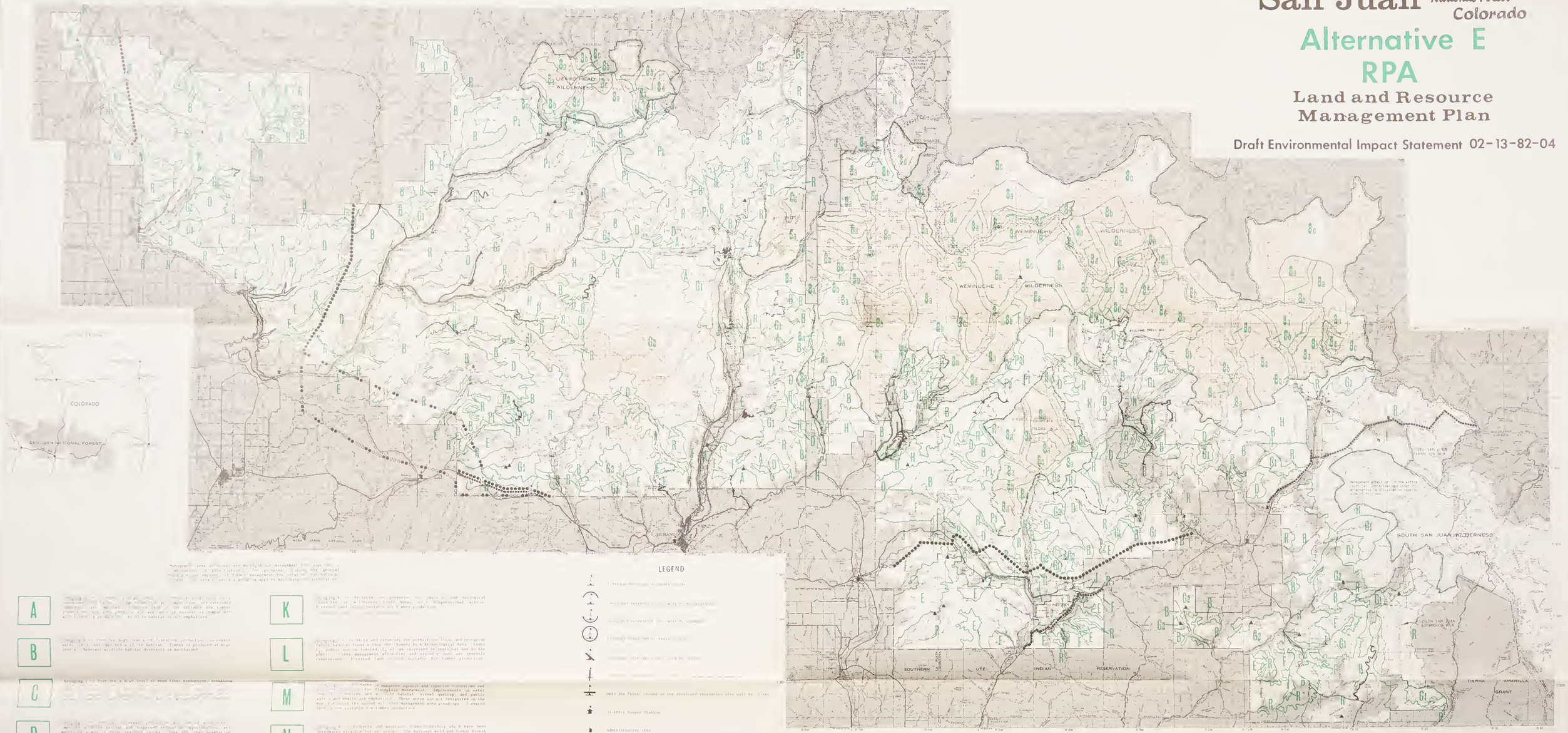
San Juan National Forest Colorado

Alternative E

RPA

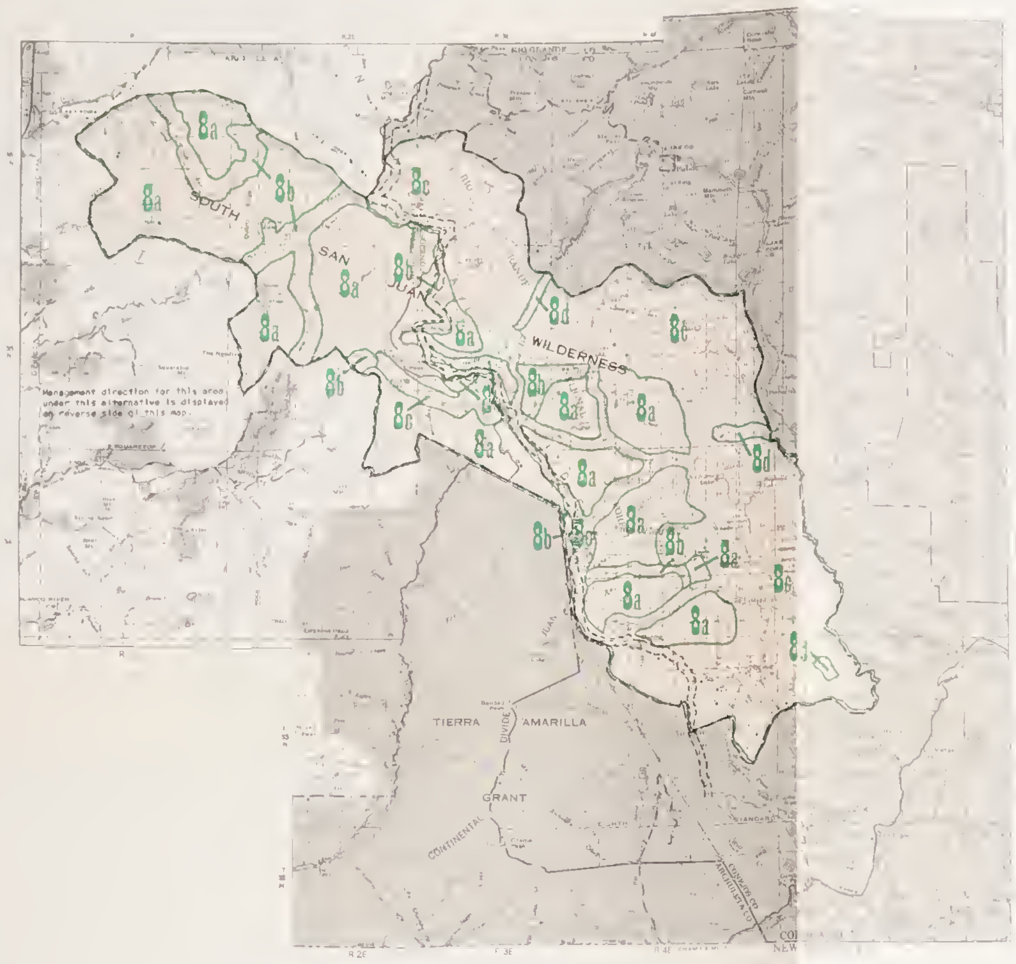
Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04



"Management area groupings are mutually exclusive management allocations of public lands. The groupings express the general direction management will follow. Management practices and the extent to which each area will be available for timber harvest is dependent upon applicable laws and regulations, and the National Forest Management Act process. Timber harvest will occur only in areas where it is compatible with the primary purpose of the area and where it is physically and economically feasible and where other resource values will not be irreparably damaged. Timber harvest will be scheduled only on lands identified as suitable for timber production. Timber harvest will be regulated to assure that the land can be restocked within five years after harvest. Timber harvest will be conducted in a manner that minimizes damage to soil, watershed conditions, fish and wildlife habitat, and other resource values. Where timber harvest is incompatible with the primary purpose of the area, only enough timber will be harvested to meet the objectives for the area. Where timber harvest is compatible with the primary purpose of the area, the amount of timber that will be harvested is limited to the volume that can be removed annually in perpetuity on a sustained yield basis. In addition, timber will not be harvested if it cannot be removed without causing irreversible damage to soils productivity, streambanks or other resource values. Even-aged timber harvest methods will be used only when they are determined to be the optimum method for meeting the specific objectives for the area. Where even-aged timber harvest methods are used, the size of openings will be varied according to the needs of the species being managed, but openings will not exceed 40 acres, except that openings may exceed 40 acres to comply with sanitation regulations or to protect other resources. Where even-aged timber harvest methods are used, the harvest will be conducted in a manner that assures the timber production capability of the land is not irreversibly damaged. Reforestation will occur within five years after timber harvest. Trees will be harvested in a manner consistent with multiple use objectives established in the Forest Plan. Methods such as aerial or ground logging systems will be used according to which is most appropriate for the terrain, resource values to be protected, and safety considerations. Maximum size limits for the largest trees to be cut may be established to retain wildlife habitat, aesthetic values, genetic diversity, or other resource values. Harvesting practices will be designed to minimize damage to the residual stand. Provisions will be made to protect streambanks, lakeshores, and riparian areas. Provisions will be made to protect soil productivity, watershed conditions, fish and wildlife habitat, and other resource values during and after timber harvest activities. Specific harvesting practices will be prescribed to meet the objectives for each area. Where necessary to protect other resource values, modified logging systems, special cutting practices, limitations on the periods of operation, or limitations on the design of roads and landings will be required. Where opportunities exist, timber harvesting may be used to improve wildlife habitat, forage conditions, or other resource values. Where timber harvesting is not compatible with the primary purpose of the area, it may be used to accomplish secondary objectives if consistent with the primary purpose. Salvage harvesting may occur in areas not suitable for timber production when needed to recover timber killed or damaged by fire, insects, disease, or windthrow. Sanitation harvesting may occur in areas not suitable for timber production when needed to control insects or disease. Timber may be harvested from areas not suitable for timber production when needed to protect, enhance, or modify the characteristics that qualify the area for its designation

Notes:



LEGEND

National Forest Boundary
Adjacent National Forest Boundary
County Boundary Line
Reservation Boundary
Wilderness or Primitive Area Boundary
Interstate Highway and U.S. Highway
State Highway
Forest Route
Paved Road
All Weather Road
Dirt Road
Primitive Road
Trails
Railroad

District Ranger Station
Forest Service Station
Mine, Quarry or Gravel Pit
Recreation Site
Recreation Site other than Forest Service
Ski Area
Overlook
Point of Interest
Visitors Center
House, Cabin or other Building
Dam
Well
Lands covered by this plan

Scale ½" = 1 mile

LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

CDNST — Continental Divide National Scenic Trail

NAME — Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

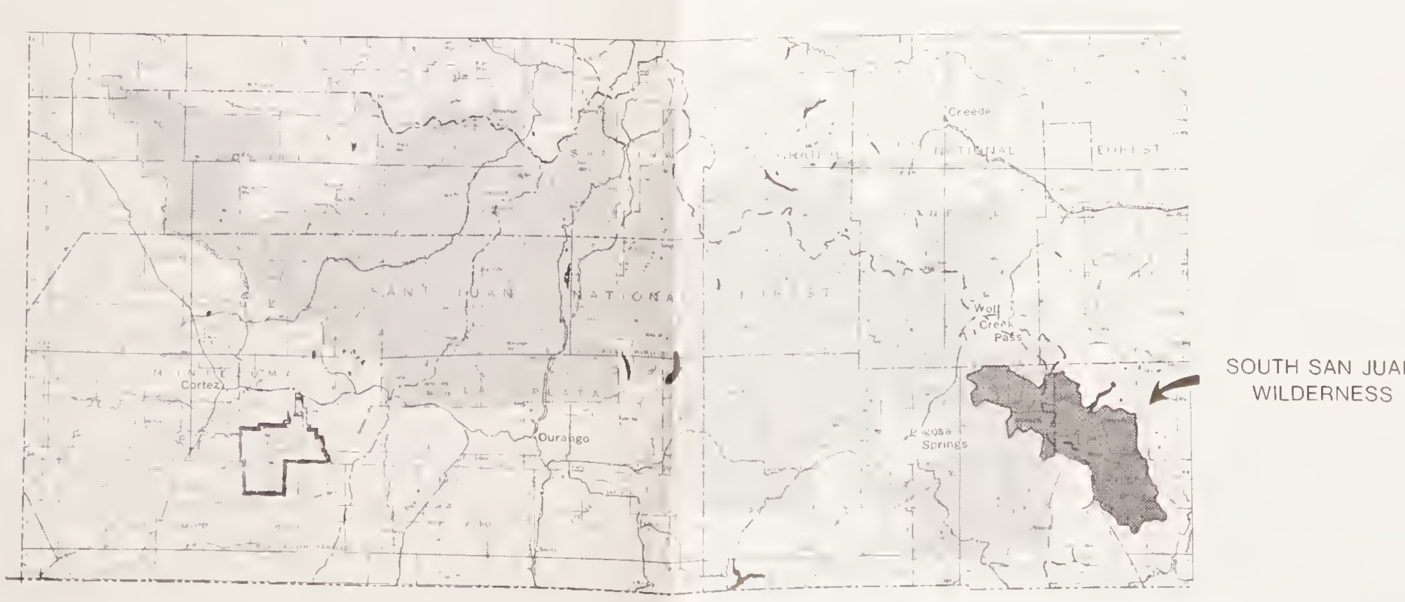
Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



R0000 923185

San Juan National Forest Colorado

Alternative F
(no action)

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04

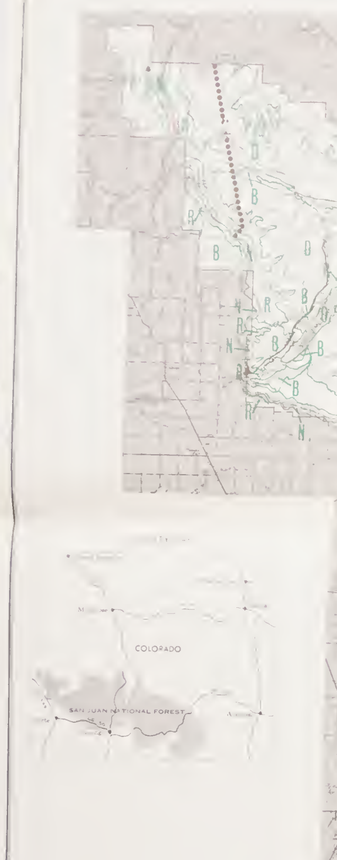
San Juan National Forest Colorado

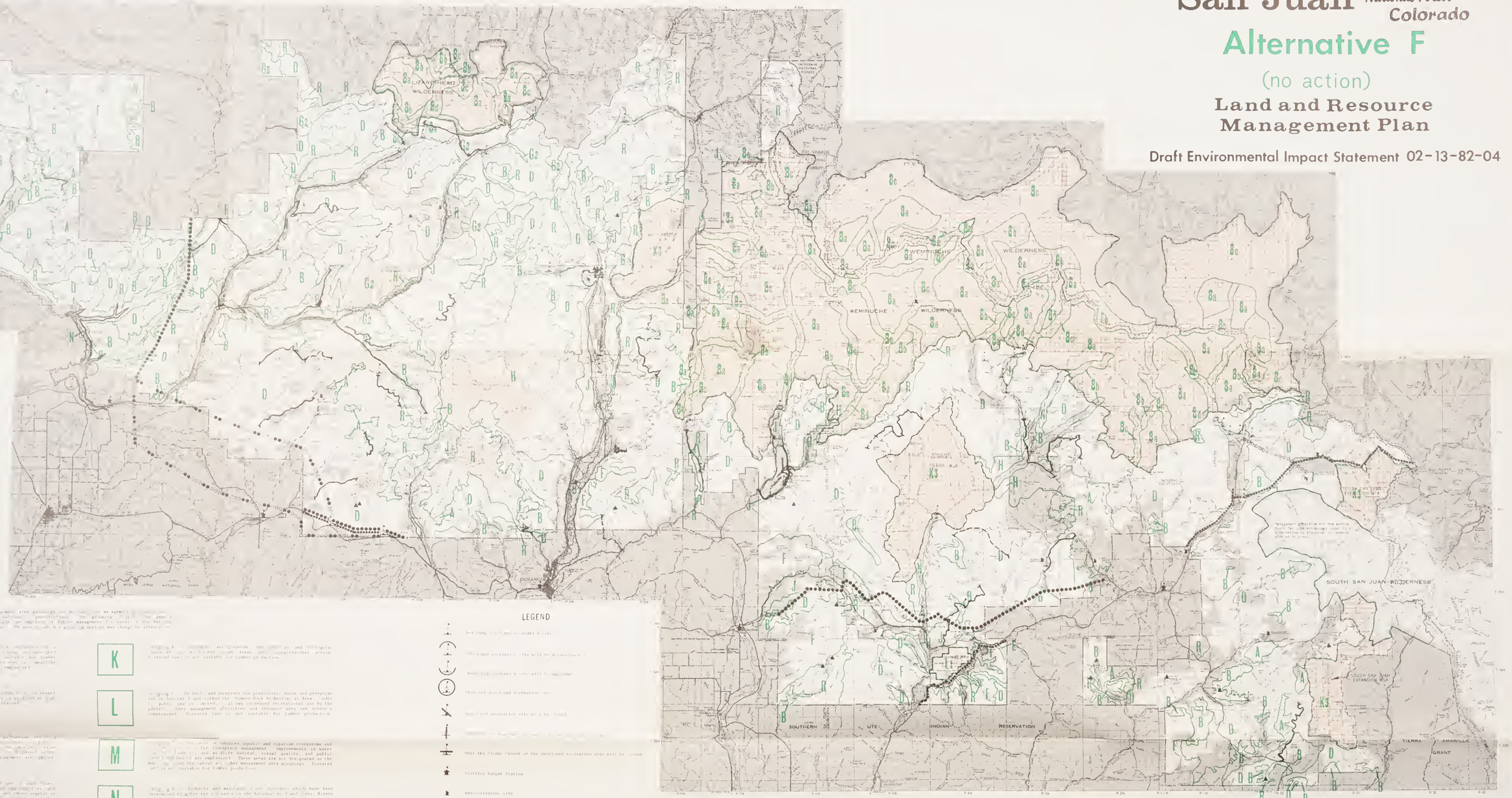
Alternative F

(no action)

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04





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THE MANAGEMENT AREA IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO NON-LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

LEGEND

- Bedding, food and recreation site
- Developed recreation site will be reconstructed
- Developed recreation site will be expanded
- Proposed developed recreation site
- Undeveloped recreation site will be closed
- Undeveloped recreation site
- Only the Picnic Ground on the developed recreation site will be closed
- District Ranger Station
- Administrative site
- Existing ski area
- Ski area will be expanded
- Proposed ski area
- Proposed McPhee Reservoir project
- Continental Divide National Scenic Trail
- Existing electronic site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- Corridor boundary for proposed/any project pipeline and power-transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- Corridor boundary for proposed power transmission line
- Forest Supervisor's Office
- NAME — Wilderness and Special Area boundary and name

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest Headquarters.

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U. S. Highway
- State Highway
- Forest Route
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisors Headquarters
- District Ranger Station
- Forest Service Station
- Mower Cabin or other Building
- Dam
- Well
- Water Well
- Spring
- Mountain Pass
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site (other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Lands not covered by this plan

Notes:



N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- Interstate Highway and U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trails
- Railroad
- District Ranger Station
- Forest Service Station
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Visitors Center
- House, Cabin or other Building
- Dam
- Well
- Lands not covered by this plan

Scale 1/4" = 1 mile

0 1 2 3 4 5

LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

CONST — Continental Divide National Scenic Trail

NAME — Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8

Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

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SOUTH SAN JUAN WILDERNESS

RNDOO 923185

San Juan National Forest Colorado

Alternative G

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

Alternative G

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04



Management area groupings are multiple use management prescriptions or combinations of prescriptions for the groupings. Where the general multiple use emphasis of future management for areas is the National Forest. The area to which the grouping applies may change to alternative

A — Grouping A -- Provides a high level of diversified production with a sustained yield management emphasis and emphasis on soil and watershed protection. Forested land is not suitable for timber production. Timber and wood products are available if harvest is compatible with other resources. Wildlife habitat is not emphasized.

B — Grouping B -- Provides high levels of livestock production, increased water yield and improved wildlife habitat. Timber is produced at high levels. Moderate wildlife habitat diversity is maintained.

C — [illegible] Maintains or enhances aquatic and riparian ecosystems and provides for diversity for floodplain management. Improvements in water quality, fisheries and wildlife habitat, visual quality, and public safety and health are emphasized. These areas are not designated on the map, but are the subset of all other management area groupings. Forested land is not suitable for timber production.

D — Grouping D -- Provides increased primary and use [illegible] for improved wildlife habitat and increased recreation opportunities. Big game habitat is a mix of other resource numbers. Trees and other vegetation are under an extensively modified regime. Improvements are made to timber management and other resources where it promotes high wood fiber production.

E — Grouping E -- Provides and maintains high quality habitat for wildlife. Wildlife numbers are increased watershed conditions are improved, with a high degree of vegetative diversity as provided. Existing vegetative diversity is extensively modified through tree and other vegetation management. Timber and livestock production are being optimum levels. Recreation is managed to provide dispersed activities in a modified setting.

F — Grouping F -- Provides a high level of wildlife habitat while maintaining other resources at moderate levels. Increased wildlife numbers and watershed improvements are emphasized. Livestock use is moderate. Wood products are produced at high levels. Commercial forest land, vegetative diversity, grass are emphasized.

G — Grouping G -- Provides semi-primitive motorized recreation opportunities. Other resource uses occur if they are compatible with or enhance the recreation experience. Livestock grazing is compatible but secondary to dispersed recreation. Forested land is suitable for timber production but is not [illegible].

H — Grouping H -- Provides high quality semi-primitive non-motorized recreation opportunities in a natural environment. Other resource uses occur if they are compatible with or enhance the type of recreation experience. Forested land is not suitable for timber production. However, wood products are available if harvest is compatible with semi-primitive dispersed recreation.

I — Grouping I -- Provides for the mainstream development and expansion of downhill ski area sites by the private sector. In areas presently undeveloped management for other resource uses is limited so that opportunity for ski area development is not lost. Provides high level road-oriented recreation opportunities along sensitive travel routes. High improvements are made in management of resources to enhance recreation opportunities and environmental quality. Forested land is not suitable for timber production.

J — Grouping J -- Provides a range of high-level road-oriented recreation opportunities along sensitive travel routes while enhancing or maintaining scenic qualities inherent in a forest environment. Decreases occur in some recreation outputs. High improvements are made in road construction, facilities, and activities that enhance recreation and the scenic qualities of the landscape. Forested land is suitable for timber production.

K — Grouping K -- Protects and preserves the physical and biological character of wilderness study areas until Congressional action. Forested land is not suitable for timber production.

L — Grouping L -- Protects and preserves the prehistoric ruins and peregrine falcon habitat found within the Chimney Rock Archeological Area. Under this, public use is limited, allowing increased recreational use by other [illegible]. Other management activities and resource uses are severely restricted. Forested land is not suitable for timber production.

M — Grouping M -- Maintains or enhances aquatic and riparian ecosystems and provides for diversity for floodplain management. Improvements in water quality, fisheries and wildlife habitat, visual quality, and public safety and health are emphasized. These areas are not designated on the map, but are the subset of all other management area groupings. Forested land is not suitable for timber production.

N — Grouping N -- Protects and maintains river corridors which have been recommended eligible for inclusion in the National Wild and Scenic Rivers System. Forested land is not suitable for timber production.

O — Grouping O -- Manages Research Natural Areas to preserve naturally occurring ecosystems for research and educational purposes. Forested land is not suitable for timber production.

P — Grouping P -- Provides high water yield on suitable lands through intensive management practices. Timber cutting is modified to increase runoff. P1 accomplishes this through commercial timber sales and forested lands are suitable for timber production. P2 accomplishes this through non-commercial vegetation manipulation and forested lands are not suitable for timber production. Wildlife habitat is not emphasized, although habitat for some species is improved. Other resource uses continue at moderate levels.

Q — Grouping Q -- Provides opportunities for developed recreation, including existing and proposed campgrounds and picnic grounds. Existing sites are managed for the safety and convenience of the forest user. Proposed sites are managed to maintain the site attractiveness until developed. Facilities at existing sites to be closed are removed. Sites within this grouping are mapped with recreation symbols (see Legend). Forested lands are not suitable for timber production.

R — Grouping R -- Provides utilization of available livestock forage for low density dispersed recreation opportunities and for maintenance of wildlife habitat. Emphasis is on providing a mix of resource outputs with very low investments. Forested lands are not suitable for timber production.

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wilderness and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8, 8a, 8b, and 8c rely on indirect means of protecting wilderness values while 8d, 8e, and 8f use intensive visitor controls. Forested lands are not suitable for timber production.

THE MANAGEMENT AREAS IDENTIFIED ON THIS MAP AND THE MANAGEMENT DIRECTION DEFINED IN THE FOREST PLAN APPLY TO NATIONAL FOREST SYSTEM LANDS ONLY. THEY DO NOT APPLY TO ANY LANDS IN STATE, PRIVATE OR OTHER OWNERSHIPS.

LEGEND

- Existing developed recreation site
- Developed recreation site will be reconstructed
- Developed recreation site will be expanded
- Proposed developed recreation site
- Forested land will be harvested
- Only the Picnic ground on the developed recreation site will be closed
- District Ranger Station
- Administrative site
- Existing ski area
- Ski area will be expanded
- Proposed ski area
- Proposed McPhee Reservoir project
- Continental Divide National scenic Trail
- Existing electronic site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- Corridor boundary for proposed CO2 project pipeline and power-transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- Corridor boundary for proposed power transmission line
- Forest Supervisor's Office
- NAME — Wilderness and Special Area boundary and name

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Large scale maps showing specific boundaries for management areas and mineral leasing are available for review in the San Juan National Forest Headquarters.

N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisor's Headquarters
- District Ranger Station
- Forest Service Station
- House, Cabin or other Building
- Dam
- Well
- Water Well
- Spring
- Mountain Peak
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest

Lands not covered by this plan

Notes:



LEGEND

Areas available for Mineral Leasing - No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

Continental Divide National Scenic Trail

Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

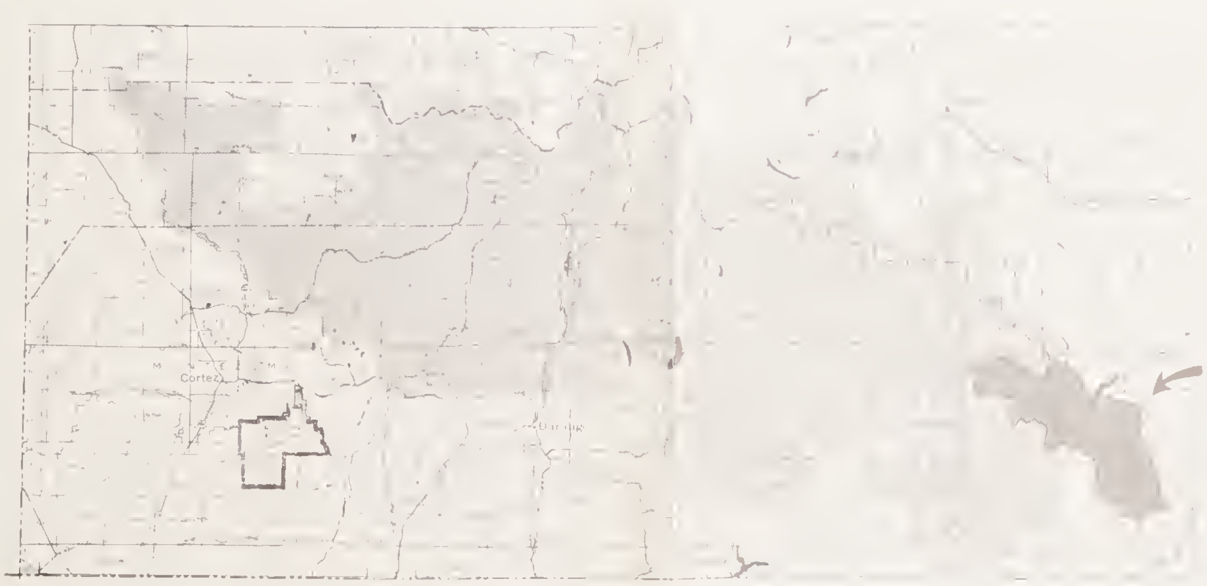
Management area groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general multiple use emphasis of future management for areas of the National Forest. The area to which a grouping applies may change by alternative.

8 Grouping 8 - Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

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Large scale maps showing specific boundaries for management areas, vegetative treatment, and mineral leasing are available for review in the San Juan National Forest Headquarters.

VICINITY MAP



R0000 923185

San Juan National Forest Colorado

Alternative H
Preferred
(proposed action)

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04

San Juan National Forest Colorado

Alternative H - Preferred

(proposed action)

Land and Resource Management Plan

Draft Environmental Impact Statement 02-13-82-04



"Management area" groupings are multiple use management prescriptions or combinations of prescriptions. The groupings display the general types of use emphasis for future management in areas of the National Forest. The area to which a grouping applies may change by alternative.

A — Grouping A -- Provides a high level of timber production on a sustained yield basis. Forage production and composition, and watershed conditions are improved. Forested land is not suitable for timber production but wood products are available if harvest is compatible with vegetative productions. Wildlife habitat is not emphasized.

B — Grouping B -- Produces high levels of livestock production, increased watershed values, and improved wildlife habitat. Timber is produced at high levels. Moderate wildlife habitat diversity is maintained.

C — Grouping C -- Provides increased production and use of wood fiber, improved wildlife habitat and dispersed recreation opportunities, and maintains a mix of other resource values. Tree and other vegetative cover is extensively modified. High investments are made in timber management, and in other resources when it promotes high wood fiber production.

D — Grouping D -- Provides increased production and use of wood fiber, improved wildlife habitat and dispersed recreation opportunities, and maintains a mix of other resource values. Tree and other vegetative cover is extensively modified. High investments are made in timber management, and in other resources when it promotes high wood fiber production.

E — Grouping E -- Provides and maintains high quality habitat for wildlife. Wildlife numbers are increased, watershed conditions are improved, and a high degree of vegetative diversity is provided. Existing vegetative cover is extensively modified through tree and other vegetation management. Timber and livestock production are below optimum levels. Recreation is managed to provide dispersed activities in a modified setting.

F — Grouping F -- Provides a high level of wildlife habitat while maintaining other resources at moderate levels. Increased wildlife numbers and watershed improvements are emphasized. Livestock use is moderate. Wood products are produced at high levels. Commercial forest land vegetation diversity goals are emphasized.

G — Grouping G -- Provides semi-primitive motorized recreation opportunities. Other resource uses occur if they are compatible with or enhance the recreation experience. Livestock grazing is a compatible use, but ancillary to dispersed recreation. Forested land is suitable for timber production in G_1, it is not in G_2.

H — Grouping H -- Provides high quality semi-primitive non-motorized recreation opportunities in a natural environment. Other resource uses occur if they are compatible with or enhance this type of recreation experience. Forested land is not suitable for timber production, however, wood products are available if harvest is compatible with semi-primitive dispersed recreation.

I — Grouping I -- Provides for the maintenance, development and expansion of Ski Basin ski area sites by the private sector. In areas presently undeveloped, management for other resource uses is limited so that opportunity for ski area development is not lost. Provides high level roaded-oriented recreation opportunities along sensitive travel routes. High investments are made in management of resources to enhance recreation opportunities and area qualities. Forested land is not suitable for timber production.

J — Grouping J -- Provides a range of high-level road-oriented recreation opportunities along sensitive travel routes while enhancing or maintaining scenic qualities inherent in a forest environment. Decreases occur in nonrecreation outputs. High investments are made in road construction, fall litters, and activities that enhance recreation and the scenic qualities of the landscape. Forested land is suitable for timber production.

K — Grouping K -- Protects and preserves the physical and biological character of wilderness Study Areas until Congressional action. Forested land is not suitable for timber production.

L — Grouping L -- Protects and preserves the prehistoric ruins and peregrine falcon habitat found within the Chimney Rock Archeological Area. Under this, public use is limited. It allows increased recreational use by the public. Other management activities and resource uses are severely constrained. Forested land is not suitable for timber production.

M — Grouping M -- Enhances aquatic and riparian ecosystems and provides for floodplain management. Improvements in water quality, fisheries and wildlife habitat, visual quality, and public safety and health are emphasized. These areas are not designated on the map, but occur throughout all other management area groupings. Forested land is not suitable for timber production.

N — Grouping N -- Protects and maintains river corridors which have been determined eligible for inclusion in the National Wild and Scenic Rivers System. Forested land is not suitable for timber production.

O — Grouping O -- Manages Research Natural Areas to preserve naturally occurring ecosystems for research and educational purposes. Forested land is not suitable for timber production.

P — Grouping P -- Provides high water yield on suitable lands through intensive management practices. Timber cutting is modified to increase runoff. P_1 accomplishes this through commercial timber sales and forested lands are suitable for timber products. P_2 accomplishes this through non-commercial vegetation manipulation and forested lands are not suitable for timber production. Wildlife habitat is not emphasized, although habitat for some species is improved. Other resource uses continue at moderate levels.

Q — Grouping Q -- Provides opportunities for developed recreation, including existing and proposed campgrounds and picnic grounds. Existing sites are managed for the safety and convenience of the Forest user. Proposed sites are managed to maintain the site attractiveness until developed. Facilities at existing sites to be closed are removed. Sites within this grouping are mapped with recreation symbols (See Legend). Forested lands are not suitable for timber production.

R — Grouping R -- Provides utilization of available livestock forage, for low density dispersed recreation opportunities and for maintenance of wildlife habitat. Emphasis is on providing a mix of resource outputs with very low investments. Forested lands are not suitable for timber production.

8 — Grouping 8 -- Protects and preserves the physical and biological character of designated wilderness and wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_1, 8_2, 8_3, and 8_4 rely on indirect means of protecting wilderness values while 8_5, 8_6, 8_7, and 8_8 use administrative visitor controls. Forested lands are not suitable for timber production.

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LEGEND

- Existing developed recreation site
- Developed recreation site will be reconstructed
- Developed recreation site will be expanded
- Proposed developed recreation site
- Undeveloped recreation site will be closed
- Undeveloped recreation site
- Only the Picnic Ground on the developed recreation site will be closed
- District Ranger Station
- Administrative site
- Existing ski area
- Ski area will be expanded
- Proposed ski area
- Proposed Mc Phee Reservoir project
- Continental Divide National Scenic Trail
- Existing electronic site
- Existing power-transmission line
- Proposed power-transmission line
- Existing pipeline
- corridor boundary for proposed Oil Shale pipeline and power-transmission line
- Road segments planned for reconstruction
- Road segments planned for new construction
- corridor boundary for proposed power-transmission line
- Forest Supervisor's Office
- NAME — Wilderness and Special Area boundary and name

Areas available for Mineral Leasing -- No Surface Occupancy

Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

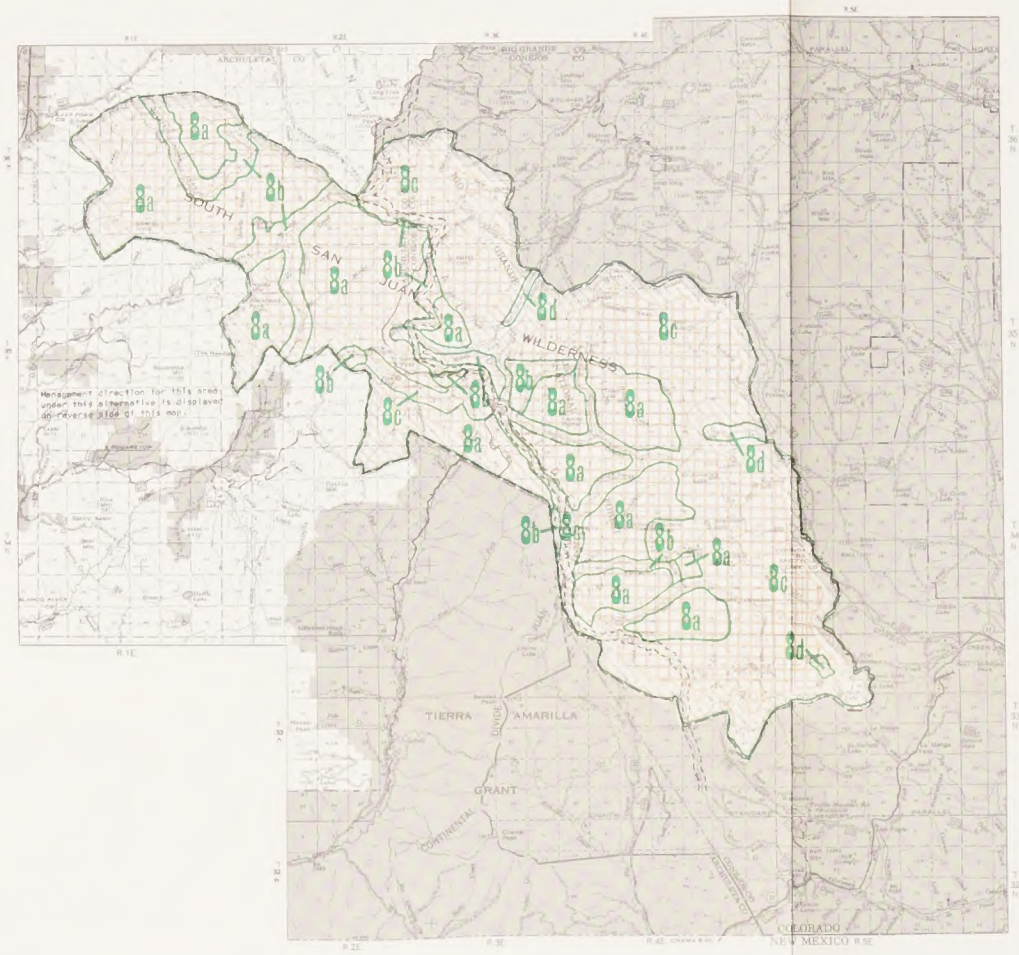
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N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Four Wheel Drive Road
- Trail
- Forest Supervisor's Headquarters
- District Ranger Station
- Forest Service Station
- House (Cabin or other Building)
- Dam
- Well
- Water Well
- Spring
- Mountain Pass
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Lands not covered by this plan

Notes:



N

LEGEND

- National Forest Boundary
- Adjacent National Forest Boundary
- County Boundary Line
- Reservation Boundary
- Wilderness or Primitive Area Boundary
- Interstate Highway and U.S. Highway
- State Highway
- Forest Route
- Paved Road
- All Weather Road
- Dirt Road
- Primitive Road
- Trails
- Railroad
- District Ranger Station
- Forest Service Station
- Mine, Quarry or Gravel Pit
- Recreation Site
- Recreation Site other than Forest Service
- Ski Area
- Overlook
- Point of Interest
- Visitors Center
- House, Cabin or other Building
- Dam
- Well
- Lands not covered by this plan

Scale ½" = 1 mile

0 1 2 3 4 5

LEGEND

- Areas available for Mineral Leasing - No Surface Occupancy
- Areas Unavailable for Mineral Leasing

All other areas available for leasing with Surface Occupancy

- CONST — Continental Divide National Scenic Trail
- NAME — Wilderness and Special Area boundary and name

MANAGEMENT AREA GROUPINGS

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8

Grouping 8 -- Protects and preserves the physical and biological character of designated wildernesses and Wilderness Study Areas in a way which leaves them unimpaired for future use and enjoyment. 8_a, 8_b, 8_c, and 8_d rely on indirect means of protecting wilderness values while 8_e, 8_f, 8_g, and 8_h use intensive visitor controls. Forested lands are not suitable for timber production.

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VICINITY MAP



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